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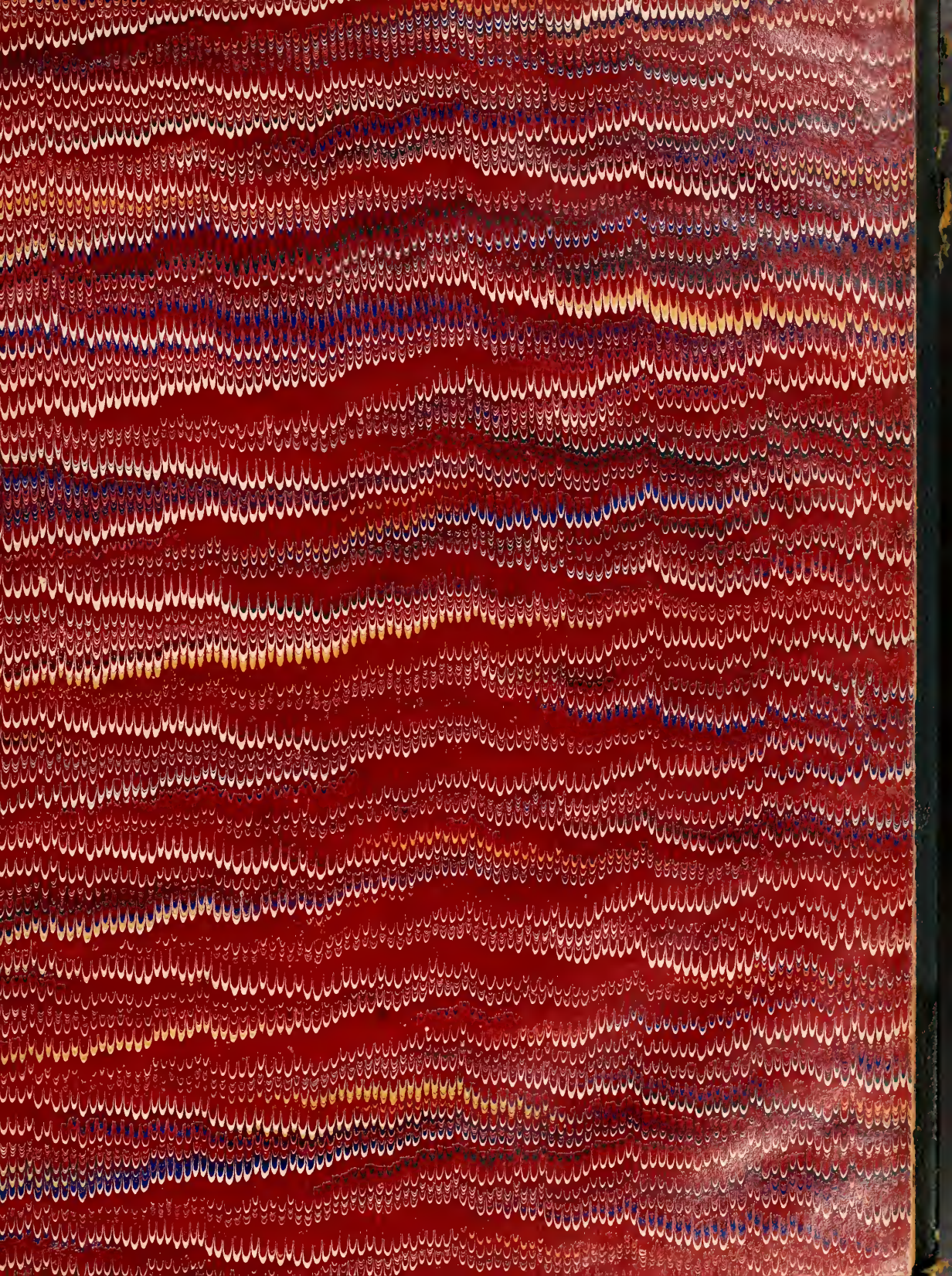

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Mr. Meek
with the
Author's regards

THE

MYRIAPODA OF NORTH AMERICA.

BY

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ARTICLE VII.

THE MYRIAPODA OF NORTH AMERICA.*

BY H. C. WOOD, JR., M. D.

Read June 16, 1865.†

The Myriapoda are air-breathing apterous articulata characterized by the distinctness of the head from the body; the strongly marked segmentation of the latter, and its method of development.

The head varies very much in size and the perfection of its organization, but is always separate and distinct. The organs of special sense are very well developed in all but the lowest orders. The eyes are in one family compound, in the others stemmatous and single or numerous, or else entirely wanting.

The body is composed of a varying number of segments, most of which are merely a repetition of the preceding. The number varies from sixteen to several hundred. As a general rule, the fewer the segments the higher the organization. Each perfected segment is formed from two subsegments, either by their coalescence and mutual growth, or

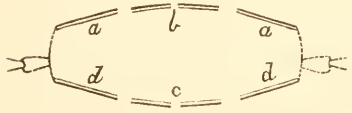
* Most of the material on which this paper is founded has been furnished by the Smithsonian Institute, Museum of Comparative Anatomy and Zoology of Cambridge, and the Academy of Natural Sciences of Philadelphia. By far the larger portion was received from the Smithsonian, much of which was collected by Mr. Kennicott in South Illinois, and R. J. Walker in Western Pennsylvania. The latter gentleman sent some seven or eight thousand specimens. Prof. Manly Miles, of the State Agricultural College of Michigan, also furnished several new species from that State. I have also examined a small collection of Canadian Myriapoda, received from Prof. Dawson, of Montreal.

In "North America," Mexico is not intended to be included, since although perhaps geographically it is a part of the latter, yet its Fauna is much more closely allied to that of Central than North America. The monograph was originally commenced at the suggestion of Prof. Baird, some four years ago, to form part of the Miscellaneous Collections of the Smithsonian Institute, and the wood-cuts have been executed at the expense of the Institution. As the publication of this series has been temporarily suspended, with the consent of Prof. Henry the paper was offered to the Philosophical Society. The wood-cuts were drawn by Mr. Edward J. Nolan, under my personal supervision, and every effort has been made to have them entirely accurate.

† The original MS. of this memoir was presented to the Smithsonian Institute, and destroyed in the conflagration of part of the Smithsonian building in the winter of 1864–5. It was then rewritten and presented for publication to the A. P. S. by the author, with the permission of the Secretary of the S. I., who granted likewise the use of such wood-cuts as were already either drawn or executed, about 60 in all. [See. A. P. S.]

by the atrophy of one and the hypertrophy of the other. The dorsal and ventral portions of the subsegments are each formed originally from four pieces. The two central unite very early in the embryo, and completely fusing form the primitive scuta and sterna, with which the outer pieces, the episcuta and episterna, unite sooner or later. Well-pronounced grooves or sutures in the adult frequently indicate the point of union between the epi and primitive sterna, the epi and primitive scuta. A typical or ideal segmental arc (Fig. 1) would therefore be formed by the conjunction and coalescence on the dorsal surface of four pieces, and of the same number on the ventral aspect: *i. e.*, two primitive scuta (Fig. 1, *b*), each with its episcutum (Fig. 1, *a*); and two primitive sterna (Fig. 1, *c*), each with its episternum (Fig. 1, *d*). To the upper or dorsal portion pertains the organs of vegetative life: *i. e.*, the circulatory and secretory apparatuses; to the lower or ventral portion the organs of animal life, the nervous system.

Fig. 1.



In this typical segmental arc the perfected scutum and sternum do not coalesce, nor do they even approximate and unite by suture, but are connected by a strong flexible integument. This membrane is divisible into two regions, the upper of which is subsidiary to the scutum, the lower to the sternum. Now, it is in this portion of the segmental arc that the appendages are formed, a sternal and scutal pair to each subsegment. On the examination of a Scolopendra, some little plates will be found situated on the lateral membrane, just anterior to the spiracles. These are the rudiments of the scutal appendages, which are never more highly developed in the Myriapoda. The normal scutal appendages of an articulate are wings, whose points of origin in the hexapoda correspond to these plates. Of course, then, in apterous articulates they cannot be developed. The sternal appendages are the organs of locomotion, the legs. To sum up, a typical myriapodal segment is formed from two subsegments, each of which is originally formed from eight pieces, and is composed of a dorsal and ventral arc, united by a membrane, and furnished with a single pair of appendages.

The *existent* myriapodal segments follow two structural plans or types, modifications of the typical or ideal. These constitute the two great orders, the Chilopoda and the Diplopoda. In the first of these, the anterior subsegment is so atrophied that it really forms no part of the perfected whole. Its appendages are entirely lost; indeed, its only representatives are some small plates, situated on the ventral surface just anterior to the sterna. On the other hand, the posterior subsegment, with its appendages, is developed to the highest degree, and equally, or nearly equally so, in all its parts, neither the ventral nor dorsal portion of the arc predominating. So in a Chilopod there are large sterna and scuta, sepa-

rate from one another, but connected by a lateral membrane, and each segment is furnished with a single pair of large legs.

In the Diplopoda, one subsegment is not thus developed at the expense of the other, but, the two coalescing, the perfected whole is obtained by their mutual growth. There are therefore two sets of appendages, two pairs of legs, to each segment. The dorsal or vegetative portion of each subsegment is, moreover, developed much more highly than the ventral or neural arc. Indeed, the scuta completely absorb the lateral membranes, and abut directly against the sterna. These latter are always more or less atrophied, and, their appendages partaking of their stunted growth, the legs are much smaller than in the Chilopoda. The excess of the vegetative systems point to a position below the Chilopoda, an indication which all the other minor facts corroborate. An examination of the Chilopoda shows that as the scale is descended the number of segments increases, the rudiments of the anterior subsegments become more and more pronounced, and the legs smaller and smaller, thus approaching the diplopod type.

In the Diplopoda the genital apertures are placed in the anterior portion of the body, and, as far as I have examined, always furnished with more or less prominent organs; whilst in the Chilopoda they are placed in the posterior portion of the body, and very generally not so provided. There is also a great and persistent difference in the appearance of the anal aperture in the two orders.

The whole organization of the Chilopods fits them for their predatory and carnivorous habits. The distinctness of the segments, which are not closely approximated, but are conjoined by membranes, and the flexibility of the segments themselves, enable them to move their bodies in every conceivable direction. Their highly organized muscular and nervous systems, the compactness of their intestinal apparatus, and the length and power of their legs, all betoken habits of great activity. Whilst the formidable nature of their mandibles, and the sharp spines, both lateral and terminal, with which their feet are armed, fit them for predatory warfare.

There can be no doubt but that they are provided with poison glands situated at the base of the mandibular teeth, and perhaps also at the bases of the terminal claws of the feet. I remember once to have been bitten by a female Scolopocryptops sexspinosa, who was trying to defend her young. Though of such insignificant size, when compared with the tropical Scolopendra, yet the pain produced lasted for several hours. It is therefore easily to be imagined that the huge species, a foot in length and inch in breadth, found in the tropics, have the power of doing considerable mischief. I have been informed by a resident of Texas, that minute ulcers follow the wounds made by the feet of S. heros on the skin.

The Diplopods depend upon the vegetable kingdom for their sustenance. The body is

much more rigid than in the Chilopods, from the close conjunction, or often imbrication, of the segments, and the inflexibility of the segments themselves, caused by the density and thickness of the scuta and sterna and the absence of lateral membranes. For this reason the Diplopoda possess but little or none of that power of raising and twisting the body, which is so annoying to the collector of tropical Scolopendra. The poorly developed nervous system and organs of special sense, the short weak legs, and the weak muscular and large intestinal development, all point to the vegetable nature of the food of this order and the associated sluggish habits, which indications the total absence of offensive armature confirms.

M. Brandt (Recueil) divided the Myriapoda into *Myriapoda manducentia* and *Myriapoda sugentia*. The former comprises all those which are provided with mandibles or jaws for seizing or devouring food. The latter, the few centipedes which have the different pieces about the mouth so united and consolidated as to form a tubule, fitted for the ingestion of liquid food. Although this classification has emanated from such an authority, yet it seems apparent that it does not agree with nature, and must be abandoned. Still, it has seemed to me that in doing this Mr. Newport and others have not allowed these characters the weight that they deserve. Mr. Gray does not even allow them generic force, if his classification (Cyclop. Anat. and Physiol., art. Myriap.) is to be trusted. Or was he entirely ignorant of their existence! Newport gives to them a family significance.

The different structure of the mouth, and the consequent different food and habits of living, although not sufficient to stand in competition with the characters separating the Chilopoda and Diplopoda, are still of higher import than any other differences in the latter order. I have therefore divided the Diplopoda into two suborders, the *Chilognatha* and *Sugentia*, retaining old names, but giving new significance to them. The minor characters have seemed to me to confirm this, and to indicate that it is coincident with the plan on which the Myriapoda have been created. M. Brandt (Recueil, p. 26) divides the Chilopoda into the *Schizotarsia* and *Holotarsia*. These appear to constitute natural sub-orders, and are consequently here retained as such.

There has been a great difference of opinion amongst naturalists as to the rank of the Myriapoda, and the position which they occupy amongst the articulata. Mr. Brandt, Gervais, Dana, and others consider them as nothing more than an order of the class Insecta; Le Conte (Class Coleop. N. Am. Introd., p. vii) considers them as a subclass of the class Insecta; whilst Leach, Latreille, Newport, T. Rymer Jones, &c., grant to them the rank of a class. The latter gentlemen differ, however, as to their position in the zoological plan. Mr. Newport places them just above the Vermes, and this seems to be their natural position.

There is doubtless a good deal of resemblance between a hexapod larva and a myriapod,

but the mode of development and growth of the latter is so different from that of the hexapoda, arachnida or octopoda, and crustacea or decapoda, that it seems to me they must be acknowledged as a separate class. Now, their method of development is similar to that of the Vermes, hence the reason of their being placed next above them. When a spider, or insect, or crustacean leaves the egg, its body has its maximum number of segments, and development takes place by the coalescence and disappearance of some of these. The embryonic myriapod, on the contrary, has its minimum number of segments, and develops by their increase. So that whilst the adult insect has generally fewer, never more segments than the young, the adult myriapod may have eight times as many, and never fewer than its young.*

Ord. I. CHILOPODA. *Leach.*†

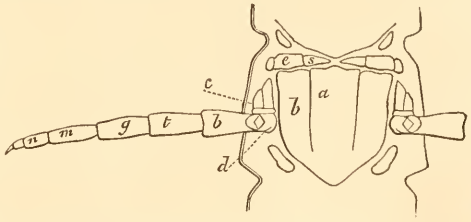
Corporis segmenta, singulum pedum pare unico instructum.

Segments of the body, each furnished with a single pair of feet.

The body in the Chilopoda is composed of segments, whose number varies from sixteen to several hundred. Each segment is furnished with a single pair of legs. There might seem to be an exception to this in the Cermatiidæ, but close examination shows that in them the fact of there being but one scutum to two segments is the cause of the apparent anomaly. In all the other families there is a scutum and sternum to each segment. These external bones, so to speak, are connected by a tough membrane, which forms the only protection to the sides. In the upper portions of this are placed the spiracles, in the lower the insertion of the legs.

Close to the spiracles, and belonging to the dorsal section, are two osseous points, the rudiments of the paraptera, which attain to some importance among the Hexapoda. At the insertion of the legs are several small plates, the epimera (Fig. 2, *c*), which afford points of origin to the retractor muscles of the legs. The posterior of the two embryonic subsegments forms the mass of the segment; but the scutum of the anterior is perhaps represented by a raised band on the front of the main scutum. The ventral portions of it are, however, much more distinct. These are

Fig. 2.



* I would refer any one desiring to follow this further to Mr. Newport's paper. Linn. Trans., vol. xix.

† Linn. Trans., vol. xi.

a series of small plates anterior to the sternum, representing the two parts of the primitive sternum (Fig. 2, *s*), and the two episterna (Fig. 2, *e*), as well as the epimeral plates.

The legs contain each a coxa (Fig. 2, *d*), a femur, *b*, a tibia, *t*, a tarsus, *g*, and metatarsal joints, *m*, *n*. The coxæ are generally small, except those of the posterior pair of legs, which are often very large, and are known as the lateral anal appendages. Among the Cermatiidæ and Lithobiidæ, however, they all attain to a considerable size. The metatarsal joints vary very much; in the genus Scolopendra there are but two to each leg, whilst among the Cermatiidæ there are a great number.

The head in the Chilopoda is composed of eight subsegments consolidated into two or more segments, as was first shown by Mr. Newport. The first segment is styled the cephalic. It reaches its maximum size in the Cermatiidæ, in which it is the most prominent part of the body, supporting a pair of very large compound eyes, and almost completely concealing the strikingly atrophied basilar segment. Traces of the division into the four subsegments, that existed during embryonic life, are occasionally met with, especially among the Lithobiidæ, but the embryological labors of Mr. Newport have shown conclusively that it is so formed. The head in the Scolopendridæ has, in addition to the cephalic segment, another one of variable size; this is the basilar. It is also found well developed in all the other families except the Cermatiidæ. Near its anterior border there is often found a deep crescentic groove; the portion separated by this from the main body, is called the prebasilar fold or subsegment. In the genus Mecistocephalus this subsegment is entirely separated from the rest, its scutum existing as a small plate immediately posterior to the cephalic, and is there called the prebasilar. In the other genera of the Geophilidæ this is wanting, but there exists posteriorly another segment, answering to the posterior portion of the basilar of the Scolopendridæ. It is the subbasilar of Newport. The under surface of the head, comprising as it does the organs of nutrition, is much more complicated than the upper, and, in order to show the relations of parts more clearly, I will trace them out minutely in the genus Scolopendra, where perhaps their analogy is most easily discovered.

On examining the under side of the head of a specimen of the genus Scolopendra, we will find a band constituting the most anterior portion, with which the antennæ partially articulate; this band I take to be the anchylosed primitive sterna and episterna of the first cephalic subsegment, of which the antennæ are the appendages. Just posterior and inferior to the eyes, we will see what is apparently an inversion of the cephalic scutum, but closer examination shows it to consist of two small plates, the superior exterior (Fig. 3, *e*), uniting with the scutum by suture, the inferior interior (Fig. 3, *h*) approximating to the other plate; the first of these is the atrophied episternum, the other the primitive sternum of the second cephalic subsegment. United with this sternum by

suture we will find posteriorly a larger plate (Fig. 3, *d*), which articulates on its inner side with another obliquely transverse plate (*b*), which also is conjoined on its inner side by another (*c*), and that too by another, and finally in the centre there is a small tooth, as it were. These plates are respectively the coxa, femur. tibia, tarsus, and the rudimentary metatarsæ (the central tooth) of the atrophied and misplaced appendages of the second cephalic subsegment. The tibia and tarsus are generally anchylosed together, but I have seen them separate. Conjoined and posterior to the coxa of the second cephalic subsegment we will find a large plate (*a*) articulating with the cephalic scutum by suture; this I take to be the primitive sternum and episternum of the third cephalic subsegment atrophied and fused together; to it the true maxillæ are articulated. These consist each of, first an elongated crooked plate (the coxa) articulating with two plates, the exterior of which (the femur) is armed with a tubercle, as in the mandibles, posterior legs, &c.; the inner plate is the tibia; these two plates articulate at their distal end with a third, the tarsus and metatarsus coalescent, but with the line of their junction very apparent. The maxillæ I believe to be the appendages of the third cephalic subsegment. Just anterior to the primitive sternum of the first, and posterior to that of the third, are often found some small plates which I believe to be epimeral. But the largest of the latter is probably the episternum of the fourth cephalic subsegment, which is scarcely to be found elsewhere. Proceeding still posteriorly we come to the maxillary palpi (Fig. 4), which are possessed each of a distinct femur (*f*), tibia (*x*), and tarso-metatarsal joint (*m*). They are the appendages of the fourth cephalic subsegment. Between them are two small plates, the lingua (Fig. 4, *l*), which I think are the primitive sterna, not episterna (as Mr. Newport believed), of the fourth cephalic subsegment. Posterior to the sterno-episternal plate of the third subsegment is a subtriangular plate, one of the episterna of the first basilar subsegment; interior to this is a large irregularly four-sided one, forming a portion of the palpus (Fig. 5, *a*); this is one of the primitive sterna of the first basilar subsegment; still within this is an elongated plate (*e*), the coxa of the palpus. With these two last the femur (*b*) of the palpus is articulated at its proximate end, while to its distal end is fitted the tibia (x), and to it the tarsus (*m*). The sterna and appendages of the second and third are very much coalesced and difficult to distinguish clearly; but I think that the dental lamina are probably the appendages of the second basilar subsegment, the

Fig. 3.

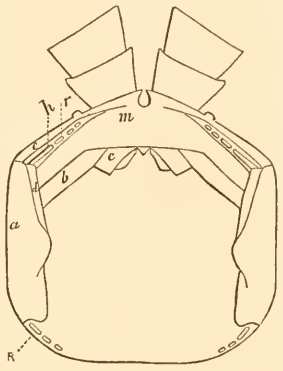
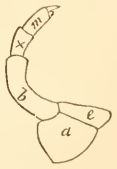


Fig. 4.

Fig. 5.



anterior portion of the labium, which I have frequently seen separated by a suture, being composed of the episterna and primitive sterna of the same subsegment. The mandibles are probably the appendages of the third basilar subsegment, the posterior portion of the labium being composed of the sterna of the same subsegment. Two plates, which are bent round the sides of the posterior portion of the labium, may be the episterna. The sternal portions of the fourth basilar subsegment are similar to those of the segments of the body. Among the Lithobiidæ the structure of the under portion of the head is almost identical with that described above.

Among the Geophilidæ the parts of the month are so consolidated and confused that it is impossible to recognize in the adult the original plan of construction and development. On examining the under surface of the head of a Mecistocephalus, we will find the labium very large, as are also the mandibles, while the maxillæ are apparently wanting, but the maxillary palpi are recognizable. Among the Cermatiidæ the labium is moderate, cleft in the middle, the two lateral halves being movable on one another, so as to form as it were an additional joint to the mandibles; which are otherwise enormously developed, especially as to length. The palpi are very long. The maxillæ and maxillary palpi are well developed.

Sub Ord. SCHIZOTARSIA.*

Antennæ longissimæ, setaceæ, cum tarsis multiarticulatæ. Oculi compositi.

Antennæ very long, setaceous, together with the tarsi multiarticulate. Eyes compound.

Fam. I. CERMATHDÆ, *Leach.*

Scuta 8. Segmenta 16. Sterna 16. Scutorum stomata mediana. Pedes antennæque multiarticulatæ.

Scuta 8. Segments 16. Stomata of the scuta median. Feet and antenna multiarticulate.

In the Cermatiidæ the head is large, more or less truncate anteriorly, having its surface rough and uneven. The eyes are compound and very prominent. The palpi very elongate and spinous. The antennæ very long, and composed of a multitude of joints. The mandibles are elongate and distant. The scuta (eight in number) are rounded and deeply emarginate posteriorly, where they are furnished with a longitudinal, slit-like orifice or stoma. Their surface is more or less roughened with minute tubercles or spines. Their border is everted, and generally crenulate and spinous. The legs are very long, and serrated by parallel rows of spinulæ. They are also furnished with rings, of long slender

* Brandt, Recueil, p. 26

spines, encircling the joints. The sides have nine pairs of spiracles, the openings into the tracheal vessels. The anal segment in the female is elongate, and the external organs of generation are furnished with a pair of forceps, replaced in the male by a pair of styliform appendages. The sterna are small; the last, the sixteenth, is merely rudimentary. It is very evident that the number of segments is sixteen, and that each scutum is formed by the coalition of two neighboring ones. The pattern of coloration is peculiar to this family; it consists of longitudinal stripes on the body and annuli on the appendages. There has as yet only one genus been found in this family, among which so great a uniformity exists as to make the distinguishing of species a task of considerable difficulty.

The color is probably a good specific character, but is seldom, if ever, preserved. I have seen specimens of *S. forceps* changed almost immediately to green or blue, or, more commonly, bright purple, by alcohol.

Any anatomical characters are very obscure; but Mr. Newport considers the proportionate lengths of the metatarsal joints as constant, and I have found them so, as far as my limited observations have gone.

The lengths of the antennæ and posterior pair of legs, as compared with the body, are also probably good characters, but very liable to misinterpretation; for it is difficult, often impossible, to tell when the former are broken and when the latter are imperfect, reproduced, appendages. Mr. Templeton, who first suggested these points, also makes use of the size of the marginal spines of the scuta in his descriptions. The peculiarities of the surface of the scuta also appear to be good secondary characters.

Gen. 1. CERMATIA, *Illiger.*

Caput magnum. Oculi prominentes. Stomata dorsalia latera incrassata.

Head large. Eyes prominent. Dorsal stomata with their sides thickened.

Scutigera, *Lamarck,* Anim. Sans. Vertb.
Selista, *Rafinesque,* Annals of Nature.

C. forceps.

C. viridi-brunnea, faseiis tribus longitudinalibus nigro-viridibus; capite antice breviter piloso, et linea depressa longitudinale mediana et ante oculos utrinque altera curvata, et altera tranversa inter oculos, et postice depressione lata insculpto; antennis mandibulisque ferrugineis: scutis spinulis numerosis asperatis, valde imbricatis, angulis rotundatis, marginibus elevatis sed tenuibus et "spinis quam in Cerm. coleoptrata evidentioribus;" lateribus plerumque rufescenti tinctis; femoribus singulo annulo unico saturate viridi; tibiis et tarsis biannulatis; pedum pari postremo in mare corpore vix ¼ longiore (in femina bis longiore); articulo metatarsali primo secundo fere quater longiore, sequentibus quinque conjunctis fere æquali; superficie ventrali flavescente; sternis mediis canaliculatis.

Greenish-brown, with three longitudinal stripes of deep green; head anteriorly shortly pilose, impressed with a median longitudinal line, and in front of the eyes a curved one on each side, and another transverse between the eyes; antennæ and mandibles ferruginous; scuta roughened with numerous spines, strongly imbricate, with the angles rounded, the margins elevated but thin, and the spines more pronounced than in *C. coleoptrata*; sides generally tinged with rufous; femora each with a single deep green ring; tibiæ and tarsi biannulate; last pair of feet in the male scarcely ¼ longer than the body (in female twice longer); first metatarsal joint nearly four times as long as the second, about equalling the five following conjoined; ventral surface yellowish; sterna medianly canaliculate.

Selista forceps, *Rafinesque*, Annals of Nature, 1st No., 1820, p. 7.
Cerm. coleoptrata, *Say*, Journ. Acad. Nat. Sci., 1st series, ii.
" " *Lucas.*
" " var. Floridensis, *Newport*, Ann. and Mag. Nat. Hist. xiii, p. 95.
" Floridana, *Newport*, Linn. Trans. xix, p. 353.
Scutigera Floridana, *Gerv.*, Apt. iv, p. 225, et Tabl. Myriap. (Exp. dans L'Amerique du Sud, part. Sept.)
Cermatia forceps, *Wood*, Journ. Acad. Nat. Sci., vol. v, new series, 1863, p. 12.

In specimens preserved for some time in alcohol, all traces of the original color are lost, the whole animal turning to a testaceous hue. The coloration of a very large fresh female before me is as follows:

The general tint is a very light olive-brown; the median stripe is black, continuous, strongly defined, and extending from between the eyes to the posterior border of the penultimate scutum, where it abruptly terminates. The lateral stripes are black, strongly defined, interrupted, and extending from the eyes to the posterior border of the last scutum. The interruptions are so arranged that most of the scuta present three blotches on each side. The anterior portion of the head has two stripes converging anteriorly to the median line. In front of these there is a sub-round marking prolonged anteriorly. Most of the femora are provided with a very incomplete greenish black annulus, which is, however, complete on the last pair. The tibia and tarsi are biannulated. The dorsal stomata are bordered with brilliant white.

Authorities differ as to the validity of this species. I have never seen *C. coleoptrata*, and therefore cannot offer an opinion.

Hab. United States, east of Rocky Mountains.

Sub Ord II. HOLOTARSIA.*

Tarsi 3 articulati. Antennæ vix elongatæ, 14-40 articulatæ. Oculi simplices, interdum multi, interdum nulli.

Tarsus 3 articulate. Antennæ scarcely elongate, 14-40 articulate. Eyes simple, sometimes numerous, sometimes wanting.

* Brandt, Recueil, p. 26.

Fam. II. LITHOBIIDÆ, *Newport.**

Scuta 15, inæqualia. Pedum posteriorum coxæ excavationibus in facie depressa. Antennæ elongatæ, setaceæ. Ocelli numerosi vel pauces.

Scuta 15, unequal. Coxa of the last pair of feet with impressions on a depressed surface. Antenna elongate, setaceous. Ocelli numerous or few.

The Lithobiidæ have the head large and well armed. The antennæ setaceous, elongate. The eyes stemmatous. In two of the genera, they are small and numerous, but in the third large and but two in number. The mandibular teeth are strong, very acute, and probably provided with a poison-gland at their base, although it has never been anatomically demonstrated in this family, that I am aware of. The scuta are of two kinds, a large one alternating with a small one. The females have the anal segment somewhat elongate inferiorly, and provided with a pair of forceps on each side. In the males these are replaced by a pair of minute styliform appendages. The posterior coxæ have a plain depressed surface with indentations, or, as I have called them, excavations on it. I have never seen a specimen of the type of the genus Lithobius; but Mr. Newport says, that in all his specimens of the family the larger depressed surface is a deep elongate oval, whilst the smaller excavations are transverse, oval, and furrow-like. There is, among the American species of the Lithobiidæ, a group in which the larger surface is scarcely depressed, with the smaller excavations round and almost punctiform. This I have indicated as a distinct genus, with the name of Bothropolys.

The specific characters of the Lithobiidæ are derived from the number of ocelli, the shape of the dental lamina with the number of teeth, the shape, color, and structure of the scuta, &c. The number of the eyes in the adult is fixed within certain limits for each species. But when the young Lithobiid emerges from the egg, it possesses but a single pair of eyes, besides wanting some of its segments. In the genus Henicops (not yet discovered in this country), the single pair of ocelli remain as a permanent character; but in the other genera the number of eyes are gradually increased until adult life. Mr. Newport seems to think the number of labial teeth a good specific character, but I have found it to vary considerably.

* Linn. Trans. xix, p. 275.

Gen. 1. LITHOBIUS, *Leach.*

Antennæ multiarticulatæ. Caput latum, complanatum. Labium antice denticulatum, medium sulcatum, emarginatum. Coxarum excavationes magnæ, ovatæ, in serie unica in facie depressa dispositæ. (Fig. 6.)

Antenna multiarticulate. Head broad, complanate. Labium anteriorly denticulate, medianly sulcate, emarginate. Pits on the coxa large, ovate, arranged in a single series on a depressed face.

L. Americanus.

"L. ferrugineus; capite magno subquadrato margine postico elevato; antennis pubescentibus; ocellis nigris utrinque 25—26; labio complanato, polito, margine fere recto; denticulis 10, parvis, nigris, subapproximatis, scutis lævibus, convexis, subquadratis postice rectis; segmento præanali piloso, pedibus validis flavis spinis validis armatis."

Fig. 6.

Ferruginous; head large, subquadrate with the posterior margin elevated; antenna pubescent; ocelli black, on each side 25—26; labium complanate, smooth, its margin almost straight; denticules 10, small, black, subapproximate; scuta smooth, convex, subquadrate posteriorly straight; preanal segment pilose, feet robust, yellow, armed with strong spines.

L. americanus, *Newport*, Linn. Trans. xix, p. 305; Catalogue of British Museum (Myriapoda), p. 17.
" " *P. Gervais*, Apteres, iv, p. 236; et Tabl. des Myriap. (Exp. Amerique du Sud), p. 29.
? L. spinipes, *Say*, Journ. A. N. S., 1st series, vol. ii, p. 108; et in Œuvr. Entom. Ed. M. A. Gory, 1, p. 21.
? L. spinipes, *Lucas*, Hist. Nat. Anim., Art. iv, p. 543.
"L. multidentatus, *Newport*," *Wood*, Journ. Acad. Nat. Sci. 1863, p. 13.
"L. americanus, *Newport*," *Wood*, loc. cit. p. 14.

When I wrote my paper on the North American Chilopoda, I had not a large mass of material at my disposal, and fell into error in my identification of Mr. Newport's species. The characters which he relies on in separating his L. multidentatus and americanus vary so much in the two species that the extremes meet, and hence my mistake. The average number of ocelli is greater in B. multidentatus, but individuals occur of L. americanus with 33 ocelli, thus coming within the number assigned to multidentatus by Mr. Newport. The diagnosis of the species given above is that of Mr. Newport. The number of ocelli and labial teeth are too small. I would say, ocelli utrinque 26—33, denticulis 10—15. The head and scuta are distinctly but rather sparsely punctate. The alternate small scuta are proportionally very large. The scuta are quadrate or subquadrate. The posterior margins of the larger ones are straight, and the angles not prolonged, except in the last two or three, in which the posterior margin is somewhat crescentic. The angles of the lesser scuta are more prolonged than those of the others. The dorsal surface is not so

corrugated or wrinkled as in B. multidentatus; the plates give more of the appearance of thickness. Length 1¼ inches.

Hab. Eastern United States.

L. TRANSMARINUS.

Zähne der Unterlippe: 12. Zahl der Fühlerglieder: 38.
Zahl der Hüftlöcher: 5, 8, 7, 5 oder 6, 8, 7, 5.
Form der Hüftlöcher: oval. Körperlänge; 7½‴.
Sehr gewölbt, glänzend.

Kopf auffallend länger als breit, gewölbt, mit flacher Randeinfassung, die Kopffläche uneben mit vereinzelten, grob eingestochenen Punkten; hinter der sehr feinen Furchenlinie der Kopfspitze zwei runde Grübchen. Die Fühler lang, mit 38 Gliedern; Behaarung abgerieben (jedoch so viel sich noch erkennen lässt, ziemlich langborstig), das Endglied fast eiförmig.

Die Augen in fünf gebogenen Reihen, dicht gedrängt 7, 7, 5, 7, 5. Das Seitenauge oval, nahe an den übrigen. Die Unterlippe sehr glänzend, wenig gewölbt, der Zahnrand schmal, zu beiden Seiten der tiefen Mittelkerbe gebogen, beiderseits 6 kurze, stumpfe Zähne, wovon die äussern entfernter stehen. Die Unterlippe so wie die Lippentaster weitschichtig grob eingestochen punktirt. Die Rückenschilde gewölbt in den seiten etwas runzelig, der 4 Hauptschild mit einem Zahnfortsatze, dessen Innenrand aufgeworfen, auch die drei letzten Zwischenschilde mit Zahnfortsätzen, dessen Innenrand jedoch nicht aufgeworfen. Das 4., 5. und 6 Glieder Schleppbeine gleich lang, das 3. kurzer, alle Glieder seitlich zusammengedrückt, das 4—7. dicht fein eingestochen punktirt; am 3 und 4. drei Stacheln (ein mittler langer und zwei seitliche kürzere) am 5. nur der mittlere und der äussere; das 3 und 4. Glied unten mit einer Längsfurche an der Innenseite des 6 und 7. eine tiefe Längsrinne.

Die Hüftlöcher oval, am hintersten Beinpaar 5 oder 6, am vorletzten 8, am drittletzten 7, am vordersten 5. Am zweiten Gliede der weiblichen Genitalien die Zäpfchen lang und spitz; die Endkralle stumpf mit zwei ebenfalls stumpfen kurzen Seitenzähnchen.

Die Bauchschilde glänzend.

Bräunlichgelb, der Kopf, die Fühler, Unterlippe und Lippentaster röthlichbraun, letztere mit schwarzer Zangenspitze. Beine bräunlichgelb.

Vaterland. New Orleans.

Koch, Myriapoden Gattung Lithobius, p. 33.

L. MORDAX.

Zähne der Unterlippe: 12—14. Zahl der Fühlerglieder: ?
Zahl der Hüftlöcher: 6, 8, 8, 9. Form der Hüftlöcher: länglich.
Körperlänge: 14‴.

Mattglänzend, vorne ziemlich flach, hinten mehr gewölbt. Kopf breiter als lang, kahl, etwas uneben, mit schmaler Randeinfassung—überall, besonders aber die vordere Kopfhälfte sehr grob eingestochen punktirt.

Die Furchenlinie der Kopfspitze sehr fein, in der Mitte nicht eingedrückt. Fühler langgliederig, Glieder über 36. Unterlippe gewölbt, mit tiefer Mittelrinne, an der Basis sehr breit, weitsehichtig grob eingestochen punktirt. Zahnrand mit tiefer Mittelkerbe, beiderseits derselben gebogen, mit 6—7 sehr langen und kräftigen Zähnen von denen die äussern weiter von einander entfernt, als die inneren; die Lippentaster grob eingestochen punktirt.

Augen in vier gebogenen Reihen 6,6,6,6,—das Seitenauge grösser, oval. Die vordern Rückenschilde wenig, die hintern mehr gewölbt, die Fläche besonders in den Seiten, uneben, rauh, mit zerstreuten grob eingestochenen Punkten, der vierte Hauptschild mit kurzer zahnartiger Verlängerung, deren Innenrand aufgeworfen, die drei hintern Zwischenschilde an den Hinterrandsecken mit sehr langen spitzen Zahnfortsätzen, deren Innenrand jedoch nicht aufgeworfen. Die Bauschilde in der Mitte mit einer rundlichen Impression. Die Schleppbeine sehr lang, das 4—7 Glied dicht fein eingestochen punktirt. Das 3 Glied das kürzeste, das 5. das längste, das 4 und 6 gleich lang, das 3 kurz und dick, das 4 stark aufgetrieben, mit tiefer, muldenartiger Längsvertiefung, dicker als das dritte, beide unten mit einer Längsfurche; die übrigen fast walzlich, seitlich nur wenig zusammengedrückt. Am 3 und 4. unten drei Staeheln (ein mittlerer langer und zwei seitliche kürzere) am 5 nur ein Staehel.

Hüftlöcher länglich 6, 8, 8, 9. Das ganze Thier oben rothbraun, ebenso die Fühler, Lippentaster, Unterlippe, die hintern Beine und letzten Bauchschilde; die Zangenspitze und Zähne der Unterlippe schwarzbraun. Die vordern Bauchschilde und Beine bräunlichgelb.

Vaterland. New Orleans."

Koch, Die Myriapoden Gattung Lithobius, p. 34.

I have never seen any Lithobii from the State of Louisiana, and therefore do not like to speak positively as to the validity of Herr Koch's species; still it seems certain that few if any of the characters which he gives are fixed and definite. The number of labial teeth, of the eyes, shades of color, &c., the examination of thousands—literally thousands—of specimens long since convinced me vary considerably,—at least in North American species. There appears to be only one character given by him which would indicate that L. transmarinus, Koch, is different from L. americanus, Newport; it is where he says: fourth chief scuta with a toothlike process, whose inner margin is reflexed (*aufgeworfen*). As to the number of the depressions on the posterior coxæ, they are not the same even on the two sides of the same individual. On page 39, Herr Koch gives the numbers in some five individuals. In these the one extreme is very nearly twice as great as the other. Are we, then, to create new species because of differences of 4 or 5 in the number of these depressions? Again: the only important difference between L. transmarinus and L. mordax, deducible from the description, is in the number of the ocelli. Herr Koch assigns only 24 to the latter; but Mr. Newport assigned 25—26 to L. americanus! Now, does it not seem very possible that L. transmarinus and mordax are one and the same species, which is really L. americanus of Newport!

L. PAUCIDENS.

L. ferrugineus; pedibus flavis; segmento-cephalico polito, postice margine elevato; antennis elongatis, pilosis: laminis dentalibus indistinctis, singula denticulis duobus valde sejunctis armata; ocellorum paribus 17; scutis alternis majoribus politis, vix asperatis, margine postico fere recto; scutis alternis minoribus margine postico recto et angulis externis productis; coxarum excavationibus parvis, vix ovatis.

Ferruginous; feet yellow; cephalic segment polished, with its posterior margin elevated; antenna elongate, pilose; dental lamina indistinct, each armed with two widely separated denticules; pairs of ocelli 17; alternate larger scuta polished, scarcely roughened, with their posterior margins almost straight; alternate minor scuta, with their posterior margins straight and their external angles produced; excavations on the coxa small, scarcely oval.

L. PAUCIDENS, *Wood*, Journ. Acad. Nat. Sci., new series, vol. v, 1863, p. 14.

The color of the only adult specimen that I have seen approaches an orange. The mandibles are rather large. The dental lamina are almost wanting, their margins somewhat rounded and armed with two acute widely separated teeth. The color of the three or four posterior sterna is darker than that of the rest of the body. The excavations of the posterior coxæ are small, few, and nearly round. The feet are yellowish, hairy, and with well-developed articular spines. Length 1 inch.

Hab. Fort Tejon, Cal.—J. Xantus de Vesey.—Smithsonian Collection.

L. PLANUS.

"L. ferrugineo-varicgatus; capite magno subquadrato polito postice ad marginem elevato incrassato; antennis brevibus pubescentibus; ocellis utrinque 23; labio polito, pilis raris; laminis dentalibus lunatis angulis externis antice elongatis profunde emarginatis; denticulis 14 acutis, nigris; scutis dorsalibus complanatis rugosis marginis elevatis; pedibus nudis spinis articularibus parvis." Species mihi ignota.

Variegated with ferruginous; head large, subquadrate, polished, elevated, and thickened at its posterior margin; antennæ short, pubescent; ocelli on each side 23; labium polished, with scattered hairs; dental lamina lunate, anterior external angles elongate, profoundly emarginate; denticules 14 acute, black; dorsal scuta complanate rugose, their margins elevated; feet bare, with small articular spines. Species unknown to me.

L. PLANUS, *Newport*, Linn. Trans. xix, p. 366; Catalogue of British Museum (Myriapoda), p. 18.
" " *P. Gervais*, Apt. iv, p. 236; et Tabl. des Myriap. (Exp. Amer. du Sud, part. Sept.), p. 29.
" " *Wood*, Journ. Acad. Nat. Sci., new series, 1863, p. 14.

This species may belong in the genus Bothropolys, but, as I have never recognized it, I cannot say.

Gen. 2. BOTHROPOLYS, *Wood.**

Ocelli numerosi. Coxarum excavationes, parvæ, fere rotundæ punctiformesque, in seriebus 3—4 dispositæ. (Fig. 7.)

Eyes numerous. Excavations on the coxa small, almost round and punctiform, arranged in three or four series.

B. MULTIDENTATUS.

B. brunneus; segmento cephalico postice margine elevato; antennis elongatis, sparse pilosis; articulis basalibus 4 longitudine fere æqualibus; laminis dentalibus distinctis, margine antico subrotundato, angulis anticis externis subproductis; denticulis 12—19; ocellis utrinque 32—37; scutorum anticorum marginibus et posticis et lateralibus elevatis sed scutorum posticorum lateralibus solum.

Fig. 7.

Brown; cephalic segment with its posterior margin elevated; antenna elongate, sparsely pilose; 4 basal joints about equal in length; dental lamina distinct, their anterior margin somewhat rounded, anterior external angle somewhat produced; denticules 12—19; ocelli on each side 32—37; both posterior and lateral margins of the anterior scuta elevated, of the posterior only the lateral.

L. MULTIDENTATUS, *Newport*, Linn. Trans. xix, p. 365; Catal. Brit. Mus. (Myriapoda), p. 17.
" " *P. Gervais*, Apteres, iv, p. 236; et Tabl. des Myriap. (Exp. dans L'Amerique du Sud, part. Sept.), p. 29.
B. NOBILIS, *Wood*, Journ. Acad. Nat. Sci., vol. v, new series, 1863, p. 15.

The alternate small scuta are frequently almost concealed by the larger ones. The surface of the scuta is wrinkled. The posterior angles of the larger scuta are very elongate. The labial teeth are large and acute, rarely coadnate. Length 1 inch.

Hab. Eastern United States.

B. XANTI.

B. brunneus, segmento cephalico polito, aurantiaco, margine postico elevato; antennis pilosis; ocellis utrinque 18; laminis dentalibus margine antico rotundato; denticulis 16—18, nigris, acutis; scutis valde asperatis, alternis majoribus postice valde emarginatis, alternis minoribus margine postico fere recto sed angulis posticis acutis et valde productis.

Brown; cephalic segment polished, orange, its posterior margin elevated; antenna pilose; eyes on each side 18; dental lamina with their anterior margin rounded; denticules 16—18, black, acute; scuta very much roughened, the alternate larger ones posteriorly strongly emarginate, the alternate smaller ones with their posterior margin almost straight, but the posterior angles acute and very much produced.

B. XANTI, *Wood*, Journ. Acad. Nat. Sci., new series, vol. v, 1863, p. 15.

* Journ. A. N. S., new series, vol. v, 1863, p. 15. βοθρος, fovea; πολυς, multus.

The head is rather large, with a curved suture running transversely from one set of ocelli to the other, which has its convexity directed posteriorly. The first scutum approximates the head in color, has its posterior margin strongly raised, and is only slightly roughened. The other large scuta are very rough, with (sometimes indistinct, but generally well marked) rugæ converging toward the median line anteriorly. The last scutum is, however, without rugæ, and but slightly roughened. It is much narrowed anteriorly and posteriorly, and somewhat elongate. The preanal sternum is almost circular, with two lateral curved impressions and a central shorter straight one, which are probably the remains of the sutures between the plates of which it was composed during embryonic life. The articular spines are rather strong. The smallest specimen has only twelve pairs of eyes. It affords me great pleasure to dedicate this species to Mr. Xantus, through whose "exhaustive collections" the rich fauna, of what was formerly a veritable *terra incognita*, has been so rapidly developed.

Hab. Fort Tejon, Cal.—J. Xantus de Vesey.—Smithsonian Collection.

B. BIPUNCTATUS.

B. brunneus; segmento cephalico polito, margine postico elevato, labioque et sparse profunde et dense minute punctatis; oecllis utrinque 18; antennis punctatis, sparse pilosis; laminis dentalibus brevibus, latis, denticulis nigris acutis 18 armatis, margine subrotundato; scutis alternis majoribus capite simillime punctatis, politis, vix asperatis, postice emarginatis; scutis alternis minoribus postice margine recto et angulis haud produetis; sternis politis; pedibus punctatis, subrobustis.

Brown; cephalic segment polished, with its posterior margin elevated, together with the labium both sparsely profoundly and densely minutely punctate; ocelli on each side 18; antenna punctate, sparsely pilose; dental lamina short, broad, armed with 18 acute black denticules, margin somewhat rounded; alternate larger scuta punctate similarly to the head, polished, scarcely roughened, posteriorly emarginate; alternate lesser scuta with their posterior margins straight, and their angles not produced; sterna polished; feet punctate, rather robust.

B. BIPUNCTATUS, *Wood*, Journ. Acad. Nat. Sci., vol. v, new series, 1863, p. 16.

The head is of moderate size, with the posterior margin slightly emarginate and not elevated in the centre. The larger scuta are not deeply emarginate, but somewhat roughened, with a suture on each side; the anterior portion of which is longitudinal, but the posterior transverse. The transverse suture, running from one set of eyes to the other, is not as well marked as in B. Xanti. The posterior scutum is rather deeply emarginate behind. The preanal sternum is not as circular as in B. Xanti, but has similar markings.

The appearance which I have described as *densely minutely punctate* is seen only under a very high magnifying power, and is common in a greater or less degree to most species. Length 1 inch.

Hab. United States, west of Rocky Mountains.—Dr. Geo. Suckley, U. S. A.—Smithsonian Collection.

Fam. IV. SCOLOPENDRIDÆ, *Leach.**

Segmenta podophora 21—23. Oculi pauces vel nulli. Pedes postremi incrassati, plerumque spinosi.

Feet-bearing segments 21—23. Ocelli few or none. Last pair of feet thickened and generally spinous.

In this family the principal generic characters are founded upon the number of the segments of the body, the shape of the head, the number and form of the spiracles, the absence or presence of eyes, and the form of the terminal segment and its appendages. In some cases the number of joints of the antennæ seems to be a constant generic subcharacter. In the large genus Scolopendra—the Titans of the Myriapoda—the principal specific characters are founded upon, first, the number of segments to the antennæ; secondly, the number and arrangement of the labial teeth; thirdly, the peculiarities of the posterior feet; fourthly, the shape and comparative size of the head. I have no doubt that the number of joints to the antennæ is fixed for most species, but it serves more generally to distinguish groups than single species; yet it occasionally is the most reliable character separating closely allied forms. Unfortunately it must be used with great caution in the identification of individuals; for, owing to the ease with which portions of the antennæ are lost, the want of a certain number is a very indefinite negative character. After detaching a few of the distal joints, no trace of their former presence is left. For the same reason much caution is also necessary in assigning the number in a description. M. Saussure has found so much variation in this character that he considers it worthless. It is possible that it may vary in certain species; but the differences generally consist in there being too few joints, which, as has been just stated, is to be looked for, and reproduced antennæ probably have occasionally an abnormally great number of very small articles. The number and arrangement of the labial teeth sometimes constitute a good character, but there is often an agreement between distinct forms, and on examining large suites of individuals, I have found more variance in the same species than reading would lead one to look for. The posterior legs furnish the best criteria in the distinguishing of species. Most species have peculiarities either in the shape or relative size of the joints, or in the number or arrangement of spines on them. In order to show the amount of constancy that these characters possess, I have drawn up a series of tables, which may aid in establishing their value. The color, I think, is not to be depended upon, although Mr. Newport seems to attach much importance to it. In the preservation of specimens it is very liable to be altered or destroyed; besides this fact, my studies of these animals, both in museums and, to a limited extent, in the Tropics, lead me to the opinion that the color

varies exceedingly, even during life. Size is often a good distinguishing character of a species, although scarcely available for the identification of an individual.

If we consider a species as the expression of a preconceived idea, there must be, as it were, a type of every species around which the individuals cluster, restrained from departing beyond a certain limit from the central nucleus. We can see then how there may be species perfectly distinct, but the individuals of which may so approximate that there may be difficulty in placing some of them. Does the mere difficulty or impossibility of placing an individual necessarily invalidate the claims of the species? The moss *Leucobryum glaucum*, Hampe, is acknowledged by all botanists (I believe) as distinct from *L. minus*, Hampe, the most tangible difference being that the former fruits in October, the latter in May. Now I have found fruiting specimens in April, which are undoubtedly referable to *L. glaucum;* but had they been found a month or two later, would any botanist have hesitated in labelling them *L. minus?* Indeed, one of the best American authorities told me, that had I so found the specimen, he would have pronounced it to be *L. minus*, as it would not have been possible to have known that the capsules were those of the previous year.

In the other genera of the Scolopendridæ the specific characters are pretty much the same as in the true Scolopendra. But some characters specific in the latter, elsewhere become generic subcharacters.

Subfam. I. SCOLOPENDRINÆ, *Newport.**

"Spiracula valvularia in paribus 9."

Spiracles valvular in 9 pairs.

Gen. 1. SCOLOPENDRA, *Linn.*

Segmentum cephalicum imbricatum. Oculi stemmatosi, utrinque 4. Antennæ attenuatæ. Pedum paria 21.

Cephalic segment imbricate. Ocelli stemmatous, 4 on each side. Antennæ attenuate. Pairs of feet 21.

S. HEROS.

S testacea; segmento cephalico subovato, minute punctato; antennis 25 articulatis; dente mandibulari producto, gracile; dentibus labialibus 8—10, duobus intimis utrinque plerumque coadunatis; pedibus plerumque luteolis; paris postremi articulo basali, intus 5—7 spinis,† subtus 7—10 spinis in serie triplici dispositis, processu angulari 3—10 spinis; appendicibus analibus lateralibus elongatis, minute profunde punctatis, spinis apicalibus utrinque 5—7 et altera marginale armatis.

* Linn. Trans., vol. xix, p. 377.

† When giving the spines on the inner edge of a leg, I do not (as some do) include those on the terminal angular process; these are afterwards given separately.

Testaceous; cephalic segment subovate, minutely punctate; antennæ 25 articulate; mandibular teeth produced, slender; labial teeth 8—10, the inmost two on each side generally coadnate; feet generally yellowish; basal joint of the last pair within with 5—7 spines, beneath 7—10 arranged in a threefold series, angular process with 3—10 spines; lateral anal appendages elongate, minutely profoundly punctate, with 5—7 apical, and a marginal spine on each.

S. HEROS, *Girard*, Marcy's Report of Explorations on the Red River, p. 272, pl. xviii.
" " *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 18.

Var. CASTANEICEPS.

S. viridis; capite antennisque rubro-castaneis; pedibus plerumque luteolis, interdum viridibus; paris postremi articulis basalibus saturate viridibus.

Green; head and antennæ reddish chestnut; feet generally yellowish, sometimes green; basal joints of last pair very deep green.

S. CASTANEICEPS, *Wood*, Proc. A. N. S., 1861, p. 11; Journ. A. N. S., new series, 1863, vol. v, p. 18.

The prebasilar fold is connate with the basilar segment, the suture is generally, however, well marked, existing as a deep groove. The cephalic segment is slightly emarginate between the antennæ. The labial teeth vary from 8—10 in number; there will sometimes be four on one side and five on the other, the external tooth apparently being the missing one. The antennæ are 25-jointed. Out of nearly a hundred specimens that I have examined, only two or three had one or two supernumerary joints developed. The scuta are polished, generally minutely and sparsely punctate, often obscurely bicarinate, the posterior with their lateral margins elevated. The last pair of legs are rather robust, with the basal joint longer than the tibial. The scuto-episcutal sutures are apparent, the sterno-episternal very well marked. Length 5½ inches.

Hab. Georgia, Alabama, Louisiana, Texas, New Mexico, &c.

TABLE SHOWING THE VARIATIONS IN SOME OF THE MORE IMPORTANT SPECIFIC CHARACTERS.

Number of specimen.*	Labial teeth.	Spines on inner side of basilar joint of last pair of legs.	Spines on under surface of basilar surface of last pair of legs.	Spines on terminal angular process.	Spines on anal appendages.	
					Apical.	Marginal.
319	4	6	2 3 3	8	5	1
	4	6	2 3 3	6	7	1
	4	8	3 3 3	7	6	0
	4	8	2 3 3	6	6	1
197	5	leg wanting.			6	?
	4	4	3 4 2	11	5	1
322	4	6	2 3 3	6	6	0
	4	6	2 2 2	6	5	0
	4	6	2 4 2	7	6	1
	5	5	2 4 3	7	6	1
	5	6	2 4 3	7	6	1
	5	6	2 2	7		
	5	5	3 4 3	6	6	1
	5	7	3 4 3	6	5	1
		6	1 3 3	6	6	1
		6	2 3 2	6	6	1
36	3	6	3 4 3	7	7	1
	4	6	3 4 3	7	5	0
	5	7	2 4 3	6	5	1
	4	5	2 3 3	6	5	1
180	4	6	3 3 3	7	6	1
	4	6	2 4 3	7	7	0
	4	6	2 3 3	5	6	2
	4	6	2 3 3	4	6	3
	4	7	1 2 3	11	8	1
	4	7	2 3 2	7	7	1
101	4	6	2 3 3	6	5	1
	4	a reproduced leg.			5	1
†313	4	5	3 2 2	2	4	0
	4	a reproduced leg.			3	0
107	4	‡4	6	about 30	8	1
	4	5	2	about 25	9	1
	4	6	2 3 3	6	8	?
	3	6	2 4 3	7	8	1
	4	6	2 4 3	8	8	1
	4	7	2 4 3	7	8	1
	5	8	3 4 3	6	9	1
	4	a reproduced leg.			7	1
	5	?	? ? ?	?	8	1
	4	9	2 3 2	9	8	1
	§	?	? ? ?	?	8	1
		6	2 3 3	7	8	1
	4	?	? ? ?	?	9	1
	4	7	2 4 3	8	9	1
113	5	6	3 4 3	4	7	1
	4	?	? ? ?	?	7	1
	4	4	2 2 1	6	?	?
	4	?	? ? ?	?	6	

Number of specimen.	Labial teeth.	Spines on inner side of basilar joint of last pair of legs.	Spines on under surface of basilar surface of last pair of legs.	Spines on terminal angular process.	Spines on anal appendages.	
					Apical.	Marginal.
98	6	0	2 6 3	8	9	1
	4	9	3 5 3	6	8	2
	3	7	3 4 3	8	7	1
	3	7	2 4 3	7	8	0
	4	8	2 4 3	8	9	1
	4	9	3 4 3	7	8	1
	4	6	3 4 3	6	7	0
	4	7	2 3 3	6	10	1
	4	9	3 4 3	3	6	1
	4	8	3 4 4	3	5	1
	4	7	2 4 4	8	7	1
	4	8	2 4 4	6	0	1
	4	6	2 4 3	8	8	1
	4	7	3 4 3	6	8	1
	5	5	3 3 3	5	8	1
	4	?	? ? ?	?	8	1
233	4	8	2 4 3	6	7	1
	5	7	2 4 3		8	1
170	4	8	2 4 2		8	1
	4	7	2 3 3		8	1
150	4	5	2 5 3	6	7	1
	4	5	2 5 3	8	7	1
Type of Castasneiceps.	5	5	2 4 3	5	5	0
	4	5	2 4 3	5	7	1
30	5	6	3 3 3	6	6	1
	5	6	2 4 3	5	8	1
62	4	7	3 3 3	6	5	0
	4	6	3 3 3	5	5	1
38	4	6	3 4 3	7	6	2
	4	7	3 3 4	8	6	1
130	4	leg wanting.			4	1
	4	6	4 1 4 2	4	5	1
290	4	6	2 4 3	6	6	1
	4	6	2 4 3	6	8	1
	4	6	2 4 3	9	5	1
	4	7	2 4 3	8	5	2
	5	7	2 3 1	7	8	1
	4	7	2 4 3	0	6	1
94	4	a reproduced leg.			6	1
	4	6	3 3 3	6	5	1
201	4	12	‖3 3 3	7	5	0
	4	11	4 3 2 2	8	6	1
	4	6	2 4 3	6	6	1
	4	5	2 2 3	7	7	1
	5	6	2 4 3	8	7	1
	5	7	2 3 4	4	6	1

* The numbers in this column refer to the Smithsonian Collection.
† This is probably a very young individual of this species.
‡ The last legs of this specimen are evidently a reproduced pair.
§ Apparently a reproduced pair of dental lamina, as the teeth are not developed.
‖ The spines on this individual are smaller than common. It is a curious variation.

S. POLYMORPHA.

S. olivaceo-brunnea; capite dilute castaneo; segmento cephalico subovato, postice subtruncato, fere impunctato; antennis 30 articulatis; dente mandibulari tuberculo basali magno; dentibus labialibus 8, maximis, duobus intimis utrinque coadunatis, externis sejunctis; scutis interdum margine posteriore nigro-viride, marginibus lateralibus plerumque liberis; pedibus postremis robustis, supra subcomplanatis; articulo basali subdepresso, intus 3—7 spinis, subtus 10—18 spinis in serie quadruplici (interdum inordinatim) dispositis, processu angulari aut bifido aut trifido aut quadrifido; appendicibus analibus lateralibus singula 4—8 spinis apicalibus et altera marginali.

Olive-brown; head light chestnut; cephalic segment subovate, posteriorly subtruncate, almost impunctate; antennæ 30 articulate; mandibular tooth with a large basal tubercle; labial teeth 8, very large, the inmost two on each side coadnate, the external distant; scuta sometimes with the posterior margin blackish-green, the lateral margin generally free; last pair of feet robust, above subcomplanate; basal joint, and median also, subdepressed, within with 3—7 spines, below with 10—18 spines arranged in a fourfold series (sometimes irregular), angular process either bifid, trifid, or quadrifid; lateral anal appendages, each with 4—8 apical spines and a marginal one.

S. POLYMORPHA, *Wood*, Proc. Acad. Nat. Sci., 1861, p. 11. Journ. A. N. S., new series, 1863, p. 20.

The prebasilar fold is apparent but connate with the rather large basilar segment. The first segment of the body is very small; the scuto-episcutal suture are barely traceable, but the sterno-episternal are much more distinct. In a few individuals the labial teeth are small and coadnate. The color shades off from that given above to a testaceous chestnut. This species is closely allied to *S. heros*, and perhaps a differential diagnosis would not be amiss. The most important difference is in the number of joints to the antennæ. Owing to the ease with which these animals lose portions of these organs, the want of the typical number is not to be relied on in the identification of individuals. Another character which also is often not available for individual identification, but which characterizes this species, is the small size attained to. The spines of the lower surface, of basal articulations of last pair of legs, are more numerous than in *S. heros*, and arranged in four rows instead of three. The difference in arrangement is, perhaps, more apparent than real; the homologue of the first row of spines existing in some specimens of *S. heros*, but being placed a little higher up, they are thrown with those on the inner side of the limb. The angular process has fewer spines than in *S. heros*. Finally, although the species do exist on common ground, yet *heros* is a more tropical and *polymorpha* a more boreal animal, the regions which they occupy merely overlapping somewhat. Length $3\frac{1}{2}$ inches.

TABLE SHOWING THE VARIATIONS IN SOME OF THE MORE IMPORTANT SPECIFIC CHARACTERS.

Number of specimens.	Labial teeth.	Spines on inner side of basal joint of last pair of legs.	Spines on lower surface of basal joint of last pair of legs.	Spines on internal angular process.	Spines on lateral anal appendages.	
					Apical.	Marginal.
Type spec. in Coll. of A. N. S.	4	4	2 2 4 1 4*	3	8	1
	4	5	2 3 1 4 3	3	7	1
	4	5	1 3 3 3	2	6	0
	4	5	2 3 3	2	6	0
	4	6	2 3 5 1 3	3	5	1
	4	5	3 3 4 3	4	8	1
	4	6	2 1 2 4 1	4	6	0
	3	5	2 1 2 3 3	4	3	2
	5	5	2 3 3 2	4	8	1
	4	4	2 3 3 2	5	7	1
	4	5	2 3 4 1 2	5	5	0
	4	5	2 3 5 1 3	4	6	2
	3	5	3 2 4 3	4	6	0
	2	5	2 3 3 1 3	4	5	1
210	4	5	2 1 3 5 3	3	7	1
	4	5	2 4 5 3	3	5	1
†337	5	11	2 3 4 3 2	3	0	1
	4	?	? ? ?	?	0	1
242	4	1	2 2 1	4	7	1
	4	3	4 3 4 3	3	7	1
	4	6	2 2 4 3	4	6	1
135	4	5	2 3 5 5	4	4	1
	4	6	2 4 2 4 4	4	7	1
	4	5	1 3 5 4 4	4	6	1
334	4	7	3 2 3 2 1	4	6	1
	4	5	4 3 4 3	4	5	1
338	4	4	2 3 4 3 1	4	6	1
	4	3	2 1 3 3 1	3	6	1
	4	3	2 3 4 3	4	5	2
	4	5	2 3 3 3	3	6	0
	4	4	2 3 4 3	3	7	1
	4	5	3 3 4 3	4	7	0
	4	5	3 3 4 3	4	6	0
	A rep lam.	5	3 3 5 3	5	6	1
	4	5	4 2 5 4	3	7	1
	4	5	4 3 5 1 4	5	7	1
	4	7	2 2 2 4 2	6	6	1
	4	6	4 2 2 4 3	4	6	1
	4	6	2 4 4 4	4	7	1
	4	?	? ? ? ?	?	7	1
339	4	5	3 2 4 4 4	5	6	1
	4	5	3 5 5 3	4	5	1
	4	6	3 1 5 4 4	4	6	1
	4	5	3 4 5 4	4	6	1
227	4	6	3 3 5 4	4	7	1
	4	7	2 3 1 4 3	2	8	1
	4	5	3 3 5 4	4	8	1
	4	10	3 4 3 3	6	7	1
	4	5	3 2 3 4 3	2	6	1
	4	5	5 3 5 3	2	8	1
	4	7	3 3 5 5	4	8	0
	4	4	3 4 4 4	4	7	0

Hab. Sonora, Kansas, N. Texas.

S. VIRIDIS.

S. viridi-brunnea; segmento cephalico late ovato, sparse leviter punctato; pedibus flavis; antennis 23 articulatis, plerumque haud pubescentibus; dentibus labialibus 8, duobus intimis utrinque arcte coadunatis, externo acuto, sejuncto; laminis dentalibus elongatis; pedibus prostremis subcylindricis, modice robustis; articulo basali tibiali longiore, supra subconvexo, margine haud elevato, intus 2—5 spinis, subtus 7—12 spinis in serie vel triplici vel quadruplici dispositis, processu angulari 1—2 spinis; appendicibus analibus lateralibus profunde denseque punctatis, interdum elongatis, singula spinis apicalibus 2—5, et interdum altera marginale armata.

Greenish-brown; cephalic segment broadly ovate, sparsely lightly punctate; feet yellow; antenna 23 articulate, generally not pubescent; labial teeth 8, the inmost two on each side closely coadnate, the external acute, distant; dental lamina elongate; last pair of feet subcylindrical, rather robust; basal joint longer than the tibial, above convex, its margin not elevate, within 2—5 spines, below 7—12 spines arranged in a threefold or fourfold series, angular process 1—2 spines; lateral anal appendages profoundly densely punctate, sometimes elongate, each armed with 2—5 apical spines, and sometimes another marginal.

* The typical number of rows is four. The variations from this are caused by some of the spines being a fraction of a line from their normal position; they generally may be placed in four crooked rows.

† Are the hind legs with the anal appendages the original ones, or are they reproduced?

S. VIRIDIS, *Say*, Proc. A. N. S. 1821, p. 110; Œuvr. Entom. Ed. Lequien t. i, p. 23.

S. PUNCTIVENTRIS, *Newport*, Ann. and Mag. Nat. Hist. xiii, p. 100; Linn. Trans. xix, p. 386; Catal. Brit. Mus. Myriap, p. 33.

S. PUNCTIVENTRIS, *P. Gervais*, Apteres t. iv, p. 277.

S. VIRIDIS, *P. Gervais*, Apteres t. iv, p. 277; et Tabl. des Myriap. (Exp. Amer. du Sud, part. sept.), p. 30.

" " *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 22.

S. PARVA, *Wood*, Proc. A. N. S., 1861, p. 10.

The antennæ are generally, but not invariably, without pubescence. The first segment of the body is the smallest, the third the next. The sutures between the true sterna and episterna are well marked, those between the scuta and episcuta barely traceable. The cephalic segment is slightly depressed. The dental lamina have their margins rounded in some specimens. The scuta are frequently bordered with very dark green posteriorly. The dorsum in some individuals has a dark central stripe, vanishing posteriorly. This is, without doubt, the species intended to be indicated by Mr. Say, although his description is exceedingly indefinite and scarcely agreeing with the facts. I have, however, seen one specimen with its posterior feet tipped with blue, and another in which the posterior margination was yellowish, as he describes them. Neither have I any doubt in referring Mr. Newport's *S. punctiventris* to this species, although the number and arrangement of the spines on the posterior feet differ somewhat from those given by that author. One specimen belonging to the Smithsonian (No. 329) approximates to his description. The types of *S. parva* are in the collection of the Academy of Natural Sciences, brought from the mountains of Georgia by Dr. Le Conte. Length 2 inches.

TABLE SHOWING VARIATIONS IN SPECIFIC CHARACTERS.

Number of specimen.	Labial teeth.	Spines on inner surface of basal joint of posterior pair of legs.	Spines of inferior surface of basal joint of posterior pair of legs.	Spines on terminal angular process.	Spines on lateral anal appendages.	
					Marginal.	Apical.
116	4	5	2 2 2 2	2	3	
	4	6	2 3 2	2	3	
	4	4	2 1 2 2	2	4	1
	4	?	? ? ?	?	5	1
	?	5	2 2 3 2	2	3	0
	4	4	2 1 2 2	2	3	1
336	4	5	3 2 4 3	2	3	1
	4	5	3 2 3 3	2	5	1
332	4	?	? ? ? ?	?	3	0
	4	5	2 3 3 2	2	3	0
	5*	5	2 2 2 3 2	2	3	1
	7		a reproduced leg.		4	1
170	4	5	3 2 2 2	2	3	1
	4		a reproduced leg.		5	1
329	4	5	2 2 2	1	3	0
	4	?	? ? ?		2	0

Hab. Florida, Georgia.—Smithsonian Collection.

* The labial teeth in this specimen are very small and much coadnate.

S. MORSITANS.

S. flavescens; scutis plerumque postice viridi marginatis; segmento cephalico postice subtruncato, basali magno; antennis 20 articulatis; laminis dentalibus, margine antico leviter rotundato; dentibus 8—10, brevibus, obtusis; pedibus compressis; pedibus postremis brevibus, robustis, supra complanatis, subtus valde convexis; articulis basali et tibiali marginibus superioribus elevatis et fere rectangulis; articulo basali intus 5 spinis, subtus spinis 7—9 triseriatis alternantibus; processu angulari valde elongato, spinis 3—5; appendicibus analibus lateralibus dense punctatis, apice breve, spinis 3—4; squama preanali longitudine latiore.

Yellowish; scuta generally margined with green; cephalic segment posteriorly subtruncate, basal large; antennæ 20 articulate; dental laminæ, with their anterior margin slightly rounded; teeth 8—10, short, obtuse; feet compressed, last pair short, robust, above complanate, below very convex; basal and tibial joints with their superior margins elevate and almost rectangular; basal joint within 5 spines, below 7—9 spines in three alternating series; angular process very much elongated, spines 3—5; lateral anal appendages densely punctate, their apex short, with 3—4 spines; preanal scale broader than long.

SCOL. MORSITANS, *Linn.*, Syst. Nat. i, p. 1063.
" " *Newp.*, Linn. Trans. xix, p. 378.
" " *Wood*, Journ. A. N. S., 1863, p. 23.
SCOL. MARGINATA, *Say*, in Journ. Acad. Nat. Sci. Philad., 1821, p. 9; et in Œuvr. Entom. Ed. Gory. livr. i, p. 22.
SCOL. BRANDTIANA, *Gervais*, in Ann. Sc. Nat., Janv. 1837, p. 50; et Apt. iv, p. 280.
SCOL. PLATYPUS, *Brandt*, Recueil, p. 61.
" " *Newport*, in Ann. and Mag. Nat. Hist. xiii, p. 98.
S. OTOMITA, *Saussure*, Mem. Soc. Phys. de Genev., 1860, xv, p. 383, f. 42.

"This species closely resembles *S. cingulata* in its general appearance. The spinules on the inferior surface of the posterior legs are arranged in three series which alternate with one another, so that, as remarked by Mr. Brandt, who first correctly described this species, they form with each other a succession of triangles. The preanal scale is very short, somewhat quadrate, with the posterior margin very slightly rounded. The lateral appendages also are short, with a slightly produced bifid apex."

Notwithstanding the labor devoted by different naturalists to this species, I think it possible that it will be hereafter found that its history as now accepted is incorrect. The geographical range, as given by Mr. Newport, extends over those portions of South, Central, and North America which lie in or near the tropics, as well as over the whole of the West Indies and an unknown extent of China. Verily, it must be the cosmopolite of the Scolopendridæ. I have seen an individual from Japan which I believe to be the var. β of Newport. It very closely resembles the North American specimens, but a suite may show that it is distinct. I have quite a number of Scolopendræ from Georgia and East Florida, but there is not a specimen of *S. morsitans* amongst them. I suspect that *S. marginata* and *S. viridis* of Say are identical species, and that *S. morsitans* is not an inhabitant of the

United States. Say's descriptions are absolutely no guides to the species intended. M. Gervais adopts Say's species as good, and gives the following synonymy:*

"S. MARGINATA, *Say*, Journ. Acad. Nat. Sci., t. ii, p. 100, &c.
S. MORSITANS, partim, *Newp.*, Trans. Linn. Soc. London, t. xix, p. 379."

Length 4 inches.

Hab. Florida?

S. INÆQUIDENS.

S. viridi-brunnea; segmento-cephalico punctato, parvo, basali magno postice subtruncato; antennis interdum viridibus, pubescentibus, 17 articulatis; labio mandibulisque sparse subprofunde punctatis; laminis dentalibus elongatis; dentibus 6—8, utrinque intimis duobus arete coadunatis, duobus externis sejunctis, acutis; scutis interdum postice saturate viridi aut cæruleo marginatis; pedibus luteolis, gracilibus, longis; postremis robustis, articulo basali supra subconvexo, intus 3—8, subtus 7—10 spinis; processu angulari 2—6 spinis; appendicibus analibus lateralibus dense profunde punctatis, elongatis, spinis apicalibus 3—5.

Greenish-brown; cephalic segment punctate, small, basal large posteriorly subtruncate; antennæ sometimes green, pubescent, 17 articulate; labium and mandibles sparsely subprofoundly punctate; dental laminæ elongate; teeth 6—8, on each side, the two inner closely coadnate, two external distant, acute; scuta sometimes margined posteriorly with deep green or blue; feet yellowish, slender, long, the last pair robust, with the basal joint above subconvex, within 3—8, beneath 7—10 spines; angular process 2—6 spines; lateral anal appendages densely profoundly punctate, elongate, with 3—5 apical spines.

S. INÆQUIDENS, *Gervais*, Suit. a Buffon, Aptéres, vol. iv, p. 277; Exp. Amer. Sud. (Castelneau) Myriap., p. 30.
" " *Wood*, Journ. A. N. S., new series, 1863, vol. v, p. 25.

The cephalic segment is small, truncate posteriorly, and has its sides remarkably straight. The basal segment is very large, fully half again as broad as the cephalic. The antennæ are sometimes green or blue, and in all of our specimens pubescent on their distal portion. Their joints are short and almost globose. The scuto-episcutal sutures are well marked, but not so strongly as the sterno-episternal. The legs are slightly compressed. The basal joint has all of its margins well defined, so that it is scarcely subcylindrical, but rather subparallelopipedal. The spines are arranged in rows on elevated bases, so as to give the appearance of being on an interrupted crest or raised line. The apices of the lateral anal appendages are much prolonged, slightly curved upwards, impunctate and almost diaphanous. This species is separated from its southern representative, by the more rectangular and smaller cephalic segment and the larger basilar, by the more moniliform and fewer jointed antennæ, as well as by the differences in the structure of the lateral teeth and posterior pair of feet. I was at first disposed to consider the specimens as representing a species distinct from that of M. Gervais, but further examination has con-

* See Aptéres, t. iv, p. 276; et Tabl. des Myriap. Americ. (Exp. Amer. Sud. sept. part.) p. 30.

vinced me that that naturalist had a specimen with reproduced hind feet; yet it is worth while to append his description, so that the correctness or incorrectness of this opinion may be more easily shown.* Length 2½ inches.

TABLE SHOWING VARIATIONS IN SPECIFIC CHARACTERS.

Number of specimen.	Labial teeth.	Spines on inner surface of basal articulation of posterior pair of legs.	Spines on lower surface of basal articulation of posterior pair of legs.	Spines on terminal angular process.	Spines on lateral anal appendages.
267	3	3	10	2	3
	a reprod. lam.	5	8	2	3
	4	5	8	1	3
	4	4	8	2	3
268	4	5	7	2	4
	4	?	?	?	5
	4	5	7	6	4
	4	8	9	6	4

Hab. Illinois.—R. Kennicott.—Smithsonian Collection.—Massachusetts Museum Comparative Zoology.

S. LONGIPES.

S. castanea, robusta; capite castaneo, magno; segmento cephalico ovato, sparse minute punctato: segmento basali maximo; antennis 17 articulatis; mandibulorum dente tuberculoque magnis; laminis dentalibus margine antico fere recto; dentibus 6, nigris, magnis, utrinque duobus intimis coadunatis, externo sejuncto, conico; scutis interdum postice viridi marginatis; spiraculis anticis maximis; pedibus luteolis, longis, compressis, paris penultimi articulo basali spinis 5 in processu angulari terminali alterisque 1—2 armato; pari postremo valde elongato, subcylindrico, haud compresso, articulo basali tibiali multo longiore, 30—45 spinis longitudinaliter seriatis armato; processu angulari magno, spinis 6—8; appendicibus analibus lateralibus dense punctatis, elongatis, singula spinis apicalibus 8—12 et interdum alteris marginalibus 1—4.

Chestnut, robust; head chestnut, large; cephalic segment ovate, sparsely minutely punctate; basal segment very large; antennæ 17 articulate; mandibular tooth and tubercle large; dental laminæ with their anterior margin almost straight; teeth 6, black, large, the two inner on each side coadnate, the external distant, conical; scuta sometimes margined posteriorly with green; anterior spiracles very large; feet yellowish, long, compressed, basal

* "S. INEQUIDENTU (S. INÆQUIDENS).—Tête subeordiforme un peu-élargie; doubles stries dorsales parallèles continues en dessus, assez peu marquées; bord postèrieur du dernier segment triangulaire obtus; stries inférieurs faiblement divergentes; plaques des segments subarrondies à leur bord postérieur; plaque prèanale quadrilatère ètroite á bord postérieur plus étroit que l'antèrieur, droit; angles subarrondis; pièces latèrales terminées en èpine multifide tres-finement ponctuées; antennes longues, nues; sallies dentiféres finement ponctuées, à trois dent inègales, l'interne large, à bord libre rectiligne, la mitoyenne peu distincte, subarrondie, l'externe sèparèe par un espace plus grand; pieds de derrière assez longs, forts, subarrondis, èpineux en dessous et á la face interne; 6 èpines environs en dessous; et à peu près 14 au bord interne, la dernière multifide, á sept petites pointes inègales en couronne. Couleur ferrugineuse un peu nuancèe de verdâtre; antennes pâles; tête, segment forcipulaire et partie postèrieur plus ferrugineuse. Longeur de corps, 0.190; plus grande largeur, 0.022. Antennes, 0.035; pieds de derrière, 0.035."

"Des Etats Unis, á New-York, par M. Milbert (Muséum de Paris, 1824)."

joint of penultimate pair armed with 5 spines on a terminal angular process and 1—2 others; last pair very elongate, subcylindrical, not compressed, basal joint much longer than the tibial, armed with 30—45 spines in longitudinal series; angular process large, with 6—8 spines; lateral anal appendages densely punctate, elongate, each with 8—12 apical spines, and sometimes 1—4 marginal.

S. LONGIPES, *Wood*, Journ. A. N. S., New Series, 1863, vol. v, p. 26.

This species is closely allied to *S. alternans*, Leach, but differs from the characters given by Mr. Newport; first, in the mandibular tubercle (mandibular tooth of Newport), being very large and having the lesser tubercle near to its base; secondly, in the number of spines on the basal joint of last pair of legs being from 30—45 instead of from 45—60; and finally, by the roughness of the lateral anal appendages. Besides, the specimens agree in possessing important characters not mentioned by Mr. Newport, and which it is fair to conclude do not exist in his species.

The head and its appendages are very large and stout. The antennæ are generally lighter in color than the body. The first scutum is much the smallest. The lateral margins of the anterior scuta are straighter than those of the posterior, which are elevated. The posterior margin of the terminal scutum is very strongly arcuate. The scuto-episcutal sutures are traceable, but not so well marked as the sterno-episternal. The femur of the nineteenth pair of legs is furnished with two small spines on its distal extremity; that of the twentieth with one or two on its upper surface, and a well-marked terminal angular process supporting five small spines. The femur of the last pair is rather depressed than compressed, and armed with 30—45 small spines, irregularly arranged in rows on its upper, inner, and lower surfaces. The preanal scale is somewhat elongate, and narrowed posteriorly.

Hab. Florida.—Smithsonian Collection.

S. BYSSINA.

S. saturate viridis aut brunnea; capite dilute castaneo, et labio mandibulisque sparse punctatis; segmento cephalico late ovato, antice leviter emarginato, segmento prebasali nullo; anteunis luteolis, 18 articulatis, pubescentibus; dente mandibulari graeile; laminis dentalibus latis; dentibus labialibus 10, parvis, nigris, utrinque tribus intimis coadunatis; pedibus gracilibus, luteolis, modice compressis; pare postremo supra complanato, subtus valde convexo, marginibus superioribus et externo et interno acutis; articulo basali tibiali longiore et intus et subtus bi- vel tri-spinoso, processu angulari bifido vel trifido; superficie ventrali brunneo-olivacea; appendicibus analibus lateralibus profunde dense punctatis, modice elongatis, singula spinis apicalibus 2—3, apicibus haud incurvatis.

Deep green or brown; head light chestnut, with the labium and mandibles sparsely punctate; cephalic segment broadly ovate, anteriorly slightly emarginate, prebasal segment wanting; antennæ yellowish, 18 articulate, pubescent; mandibular tooth slender; dental laminæ broad; labial teeth 10, small, black, the inner three on each side

coadnate; feet slender, yellowish, moderately compressed; last pair of feet above complanate, below strongly convex, superior margins, both external and internal, acute; basal joint longer than the tibial, both on the inner and lower surface bi- or tri-spinous, angular process bifid or trifid; ventral surface brownish-olive; lateral anal appendages densely profoundly punctate, rather elongate, each with 2—3 apical spines, apex not incurvate.

S. BYSSINA, *Wood*, Proc. Acad. Nat Sci., 1861, p. 10; Journ. A. N. S., 1863, p. 26.

The head is of moderate size. The dental lamina are rather broad, their teeth small, almost tuberculiform. The scuto-episcutal sutures are traceable, but not so distinct as the sterno-episternal. The first scutum is very short, the penultimate very large, with its sides strongly arched. The legs are slightly compressed. One brown specimen has some of its scuta margined posteriorly with green. This species differs from *subspinipes* in the shape of hind pair of legs, which are parallelopipedal, and have the margins much more acute, as well as in the proportionate length of the basal and tibial joints. How far these characters are specific is not certain, and it is very possible that this species does not deserve to rank higher than a variety. Large suites of specimens can alone decide this.

The *habitat* of *S. byssina* is uncertain. Originally it was described as doubtfully living in Florida. Then specimens were found in the Smithsonian Collection labelled California. Since then others have come to light labelled Florida. It is hardly possible that the species is common to the two countries, and which is correct I am at a loss to decide. Length $2\frac{1}{2}$ inches.

S. COPEANA.

S. luteolo-castanea prasino sparsa; capite sparse minute punctato; segmento cephalico parvo, subrotundo, convexo; basali magno; antennis 25 articulatis; labio rubri-castaneo; laminis dentalibus subelongatis, margine antico fere recto; dentibus 8, nigris, utrinque duobus intimis coadunatis, extimis duobus majoribus, conicis, sejunctis; pedibus luteolis, modice compressis; pari postremo robusto, articulo basali tibiali vix longiore, supra complanato, intus 4—6 spinis, infra 9—17 spinis in serie quadruplici (interdum inordinatim) dispositis; processu angulari spinis 2—5; appendicibus analibus lateralibus dense profundeque punctatis, singula spinis apicalibus 3—5, et marginalibus 1—3; superficie ventrali sordide luteola.

Yellowish-chestnut, sprinkled with light green; head sparsely minutely punctate; cephalic segment small, subround, convex; basal large; antennæ 25 articulate; labium reddish-chestnut; dental laminæ subelongate, with their dental margins nearly straight; teeth 8, black, the two inner on each side coadnate, the two external larger, conical, distant; feet yellowish, moderately compressed; last pair robust, basal article scarcely longer than the tibial, above complanate, within 4—6 spines, below 9—17 spines arranged in a fourfold series (sometimes irregular); angular process with from 2—5 spines; lateral anal appendages densely profoundly punctate, each with 3—5 apical spines and 1—3 marginal; ventral surface a dirty yellow.

S. COPEANA, *Wood*, Journ. Acad. Nat. Sci., New Series, vol. v, 1863, p. 27.

The head is somewhat peculiar; it is not so broad as the posterior portion of the body.

The cephalic segment is convex, subround, sometimes somewhat truncate posteriorly. Its breadth is just about equal to its length, but owing to the convexity appears less. The basilar segment is much larger than the cephalic, and has the prebasilar fold well marked. The posterior portion of the scuta are often margined with green, and, in some specimens, the anterior part of the body is mottled with this color. In one individual the antennæ are of a pea-green tint; generally they correspond in color with the feet. The penultimate scutum is large, with its lateral margins strongly arched. The terminal scutum is medianly slightly subcarinate. The sterno-episternal sutures are better marked than the scuto-episcutal, which are, however, quite evident. It is noticeable that the terminal scutum has a single median, instead of two lateral sutures. The preanal scale is rather large, much narrowed, and very slightly emarginate posteriorly. Where the marginal spines of the lateral anal appendages exceed two in number, some of them are generally very small and situated at or near the base of the terminal process. I have named this species in honor of Prof. Edward D. Cope, with whom it has been my good fortune to have been associated since the earliest dawn of our tastes for natural history.

Length 4½ inches.

TABLE SHOWING VARIATIONS IN SPECIFIC CHARACTERS.

Number of specimen.	Labial teeth.	Spines on inner side of basal joint of last pair of legs.	Spines on lower surface of basal joint of last pair of legs.	Spines on angular process.	Spines on anal appendages.	
					Apical.	Marginal.
39	4	4	2 2 3 2	2	4	2
	4	5	2 2 2 4	3	4	2
309	4	6	4 4 5 4	5	5	2
	4	6	3 3 4 3	5	3	1
	4	4	2 3 5 3	2	4	1
	4	4	2 3 5 3	2	5	3
	4	6	3 3 1 5 3	4	5	3
	4	5	1 3 2 3 3	4	5	3
	4	6	3 2 3 3	3	6	1
	4	6	2 2 3 4	2	4	2
	4	5	2 3 4 3	3	3	1
	4	5	2 3 3 3	3	4	1
	4	5	1 2 4 3	3	4	1
	4	5	2 2 3 3	3	3	2

Hab. California.—Smithsonian Collection.

S. BISPINIPES.

S. olivacea, polita; capite olivaceo-castaneo; mandibulis magnis; segmento cephalico late ovato, antice leviter emarginato, basali magno, prebasali nullo; antennis 19 articulatis, antice pubescentibus; labio leviter convexo, sine suturis, minute punctato; laminis dentalibus, latis, brevibus, marginibus anticis rectis, angulis posticis externis productis; denticulis 10, conicis, parvis sed acutibus et distinctis, utrinque intimis tribus arcte coadunatis, duobus externis sejunctis; suturis scuto-episcutalibus inconspicuis, sed sterno-episternalibus modice conspicuis; pedibus

luteolis, leviter compressis; pari postremo gracile, articulo basali supra complanato, subtus valde convexo et sine spina, intus bispinoso, margine superiore exteruo acuto; processu angulari valde elongato, simplice vel bifido; articulo tibiali basali fere æquale, sed subcylindrico et graciliore; appendicibus analibus lateralibus longis, dense minute profunde punctatis, utrinque spinis apicalibus 1—3.

Olive, polished; head olive-chestnut; mandibles large; cephalic segment broadly ovate, anteriorly slightly emarginate, the basal segment large, prebasal absent; antennæ 19 articulate, distally pubescent; labium slightly convex, without sutures, minutely punctate; dental laminæ broad, short, with their anterior margins straight, the external posterior angles produced; denticules 10, conical, small but acute and distinct, the inmost three on each side closely coadnate, the outer two separate; scuto-episcutal sutures not conspicuous, but the sterno-episternal rather so; feet yellowish, slightly compressed; last pair slender, the basal joint above complanate, below strongly convex and without spines, within bispinous, the superior external margin acute, the angular process very elongate, simple or bifid; tibial joint about equal to the basal, but subcylindrical and more slender; lateral anal appendages long, densely minutely profoundly punctate, on each side with from 1—3 apical spines.

S. BISPINIPES, *Wood*, Journ. A. N. S., New Series, 1863, p. 28.

The length of cephalic segment is equal to its breadth. The mandibles are thick. The breadth of the dental laminæ much exceeds their length. The teeth are small, but very distinct. The penultimate scutum is large, with its lateral margins strongly arched; the terminal is large, with its lateral margins arched, very strongly elevated, and its posterior very arcuate. The preanal scale is not canaliculate, but much narrowed posteriorly, with its margins very nearly straight. The spines on the basal articulation of the last pair of feet are very large; the anterior is situated above the other. This species is closely allied to *S. Newportii*, Lucas (originally described by Mr. Newport as *S. Gervaisii*). Mr. Newport, in his latin diagnosis, both in the Linnæan Transactions and the Catalogue of the British Museum, says "*dentibus conspicuis*," but in the former work he says, "The most marked character of this species is the *indistinctness* of the labial teeth, which in some specimens are *entirely wanting!*" What does he mean? This species is also allied to *S. ornata*, Newport. That author states, "pedum paris postremi articulo basali *spinis tribus* acutis," but does not state the form of the head. Afterwards he says: "This is a very beautiful species, very distinct in every respect of form, size, and shape of the head from *S. subspinipes*, but *precisely similar* as regards the shape and *armature* of posterior pair of legs," &c. Now, *S. subspinipes* is furnished with *five spines* on its posterior pair of legs! The specimens before me may belong to *S. ornata*, but their heads do not differ from those of *S. subspinipes*, and it is not clear what the armature of *S. ornata* really consists of. I have seen two specimens from San Francisco, belonging to the Museum of Comparative Zoology.

Gen. 4. CRYPTOPS, *Leach.**

Segmenta podophora 21. Antennæ 17 articulatæ. Oculi nulli vel inconspicui. Labium edentulum. Scutum postremum Scolopendræ veræ illo simillimum. Pedum postremorum articulus basalis plerumque inermis. Appendices anales laterales obtusæ.

Feet-bearing segments 21. Antennæ 17 articulate. Eyes absent or inconspicuous. Labium edentate. Last scutum similar to that of the true Scolopendra. Basal joint of the last pair of feet generally unarmed. Lateral anal appendages obtuse.

"Cryptops hyalina.

"Pallida, lævis, lineis 2 longitudinalibus saturatioribus; capite antennisque ferrugineis; pedibus postremis brunneis spinulis 5 in articulo tertio tarsalive. Long. lin. 7."

Pale, smooth, with 2 deeper longitudinal lines; head and antenna ferruginous; last pair of feet brown, with 5 spinules on the third or tarsal joint. Length 7 lines.

"Crypt. hyalina, *Say*, Journ. Acad. Nat. Sci., 1st series, vol. ii; id. Œuvr. Entom. 1, sp. 23; *Gerv.* in Ann. Sci. Nat., Janv. 1837, sp. 3; *Lucas*, Hist. Nat. Anim. Artic. p. 546, sp. 3."

"*Hab.* In Georgiâ et Floridâ."

Species mihi ignota.

"C. Milbertii, *Gervais.*

"Point d'yeux; 22 segments, en comptant la tête d'un brun marron. Tête arrondie, non engagée dans le second segment. Plaques convexes non arrondies à leurs bords postérieurs, bordées. Segments très inégaux entre eux, les 1, 3, 5, 6, 8, 10, 12, 14, 16, 18, sont les moins allongés; le dernier est plus étroits et cylindroïde. En dessous, ces plaques sont un peu bombées et presque égales. Les deux paires de pattes postérieures sont plus allongées que les autres et terminées par une petite griffe; mais les cuisses ne sont point renflées ni beaucoup plus grosses que celles des autres pattes, et celles des pattes postérieures n'ont ni épines ni tubercules. Les mâchoires (ou les mandibules des auteurs) sont brunes, comme le menton ou la lèvre qui supporte les crochets des mandibules. Cette lèvre n'est point bifide, mais arrondie à son extrémitié; elle n'a point de dents, mais seulement deux enfoncements latéraux. Les mandibules ou palpes ont leurs articles cylindriques et rougeâtres; le dernier article est comme tronqué et terminé par une pointe ou onglet. Les antennes sont allongées et quand on les renverse en arrière, elles atteignent le milieu du cinquième segment; leurs articles courts, renflés, moniliformes, très-réguliers, presque égaux, sont au nombre de 17.

"Apporte de Jersey dans l'Amérique du Nord par M. Milbert. Cette espèce diffère de l'Hortensis par des pattes beaucoup plus comtes et une tête plus arrondie."

Species mihi ignota.

C. Milberti, *Gervais*, Apt. iv, p. 592.

* Linn. Trans. xi, p. 384.

Gen. 5. OPISTHEMEGA.*

Segmenta podophora 21. Ocelli nulli. Labium plerumque dentatum. Scutum postremum maximum, quadratum, alteris multo majore; pedes postremi crassi, breves. Appendices anales laterales obtusæ. (Figs. 8, 9, 10.)

Feet-bearing segments 21. Eyes absent. Labium generally dentate. Last scutum very large, quadrate, much larger than the others; last pair of feet thick, short. Lateral anal appendages obtuse.

O. postica.

O. aurantiaca; capite polito, punctato; segmento basali depressione triangulari mediana; labio antice elongato, mandibulisque punctatis; laminis dentalibus subelongatis, margine antico fere recto; denticulis 6, distinctis, acutis; antennis haud pubescentibus, 17 articulatis; scutis sternisque politis; scuto postremo subprofunde punctato, postice abrupte truncato, medio canaliculato, lateribus rotundatis, marginibus lateralibus valde elevatis; pedibus postremis brevissimis, subprofunde punctatis, subcylindricis; articulis basali tibialique sine spinis, supra subcomplanatis, intus complanatis, margine interiore superiore acuto, alteris rotundatis; appendicibus analibus lateralibus angustis, dense profunde punctatis, postice abrupte truncatis, sine spinis; squama preanali elongata, media vix canaliculata.

Fig. 8.

Fig. 9.

Orange; head polished, punctate; basal segment with a median triangular depression; labium anteriorly elongate, together with the mandibles punctate; dental lamina somewhat elongate, anterior margin almost straight; denticules 6, distinct, acute; antennæ not pubescent, 17 articulate; scuta and sterna polished; last scutum subprofoundly punctate, posteriorly abruptly truncate, medianly canaliculate, with the sides rounded, lateral margins very elongate; last pair of feet very short, subprofoundly punctate, subcylindrical; basal and tibial joints without spines, above subcomplanate, within complanate, superior interior margin acute, the others rounded; lateral anal appendages narrow, densely profoundly punctate, posteriorly abruptly truncate, without spines; preanal scale elongate, medianly scarcely canaliculate.

O. postica, *Wood*, Journ. A. N. S., new series, 1863, vol. v, p. 35.

From the triangular depression on the basilar segment two sutures diverge posteriorly. The scuto-episcutal sutures are very distinct, the sterno-episternal wanting. The sterna are, however, provided with a mesial marking, the line of coalescence of the two primitive sterna. The last pair of feet are rather shorter than in the following species, more cylindrical and smoother, especially on their inner surface. The basal joint is rather shorter than the tibial, which is about twice as long as the tarsal. Can this be the same species as *Cryptops postica*, Say? It agrees with Mr. Newport's description of his *Thea-*

* Wood, Journ. A. N. S., new series, 1863, vol. v, p. 35. Οπισθε, postice, μεγας.

tops postica (*C. postica*, Say), except as to the eyes and teeth. Is it possible that Mr. Newport is mistaken as to the possession of eyes? Say certainly did not see them. Length 1¼ inches.

Hab. North Carolina.—Dr. Wm. Stimpson.—Smithsonian Collection.

O. SPINICAUDA.

O. aurantiaca; capite polito, punctato; segmento basali depressione magna triangulari mediana; antennis 17 articulatis, antice pubescentibus; laminis dentalibus, labio mandibulisque subprofunde punctatis, margine antico rotundato; denticulis labialibus 4, parvis, arcte coadunatis, indistinctissimis; labio medio antice subcarinato; scuto postremo maximo, subprofunde punctato, alteris fere bis majore, lateribus rotundatis, marginibus lateralibus valde elevatis; pedibus postremis robustis, supra complanatis, intus complanatis et rude punctatis, articulo basali tibiali fere æquali; femore, tibia, tarsisque margine interiore superiore acuto et serrulato, femore tibiaque margine interiore inferiore quoque acuto et serrulato; processu angulari parvo, spina unica robusta acuta; appendicibus analibus lateralibus angustis, postice truncatis, dense profunde punctatis, singula spina unica apicali minutissima; squama preanali elongata, subprofunde punctata, media leviter canaliculata. (Figs. 8, 9, 10, 11.)

Fig. 10.

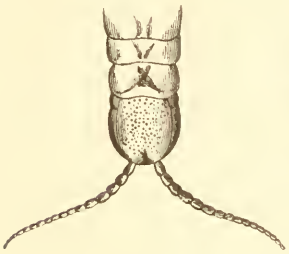


Fig 11.

Orange; head polished, punctate; basal segment with a large median triangular depression; antennæ 16 articulate, distally pubescent; dental lamina, with the labium and mandibles subprofoundly punctate, anterior margin rounded; labial denticules 4, small, closely coadnate, very indistinct; labium medianly anteriorly subcarinate; last scutum very large, subprofoundly punctate, almost twice as large as the others, with its sides rounded, its lateral margins very much elevated; last pair of feet robust, above complanate, within complanate and rudely punctate; basal and tibial joints about equal; interior superior margin of the femur, tibia and tarsi acute and serrulate; the interior inferior margin of the femur and tibia also acute and serrulate; angular process small, with a single acute robust spine; lateral anal appendages narrow, posteriorly truncate, densely profoundly punctate, each with a very minute apical spine; preanal scale elongate, subprofoundly punctate, medianly lightly canaliculate.

O. SPINICAUDA, *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 36.

The color varies greatly in depth of shade, but the two ends are almost always darker than the intermediate portion of the body; the feet, with the exception of the last pair, are generally lighter. The cephalic segment is slightly emarginate in front. The suture between the true basilar segment and the prebasilar fold is very deep; it is formed by two lines rapidly divergent from the centre, and at the central portion there is quite a large triangular depression. In some specimens the scuto-episcutal sutures are well-marked. The posterior borders of the scuta are straight. The terminal scutum is nearly twice as large

as any of the others, deeply punctate, and without a sulcus or any traces of the sutures. The last pair of legs are dark in color, short and very robust; their basilar joint is often furnished with one or two small spines, besides the terminal, on either the inferior or superior internal margin. They present the peculiar crossing of the nails found in the other species. The other legs are somewhat compressed. Length, 2¼ inches.

Hab. South Illinois, West Pennsylvania. Smithsonian Collection.

Gen. 6. THEATOPS, *Newp.**

"Ocelli distincti. Antennæ breves, subulatæ, 17—articulatæ. Segmentum cephalicum truncatum subimbricatum; margine labiali denticulato. Pedum postremorum articulus magnus, obconicus, abbreviatus. Pedum paria 21. Appendices anales laterales obtusæ."

Eyes distinct. Antennæ short, subulate, 17 articulate. Segments cephalic, truncate, subimbricate; labial margin denticulate. Joint of the last feet large, obconical, abbreviated. Pairs of feet 21. Lateral anal appendages obtuse.

T. POSTICA.

"T. aurantiaca, ocellis inconspicuis lateralibus, dentibus 8 minutis, segmento postremo maximo elongato quadrato lateribus rotundato medio profunde sulcato margine posteriore transverso, pedibus postremis brevibus crassis rotundatis attenuatis; articulo basali brevissimo. Long. unc. 8–10."

Orange, ocelli lateral not conspicuous; teeth 8 minute; last segment very large, elongate, quadrate, with its sides rounded medianly; profoundly sulcate, with its posterior margin transverse; last feet short, thick, rounded attenuate; basal joint very short. Length, 8–10 inches.

CRYPT. POSTICA, *Say*, Journ. A. N. S., Philada., ii, p. 112; Œuvr. Entom. i, p. 24; Gervais, Ann. Sci. Nat. Janv., 1837, p. 51, sp. 5; Apt. iv, p. 294.
" *Lucas*, Hist. Nat. Anim. Artic., p. 547, sp. 5.
" *Newport*, Ann. Mag. Nat. Hist., xiii, p. 110.

THEATOPS POSTICA, *Newport*, Linn, Trans., xix, p. 410; Catal. British Mus. (Myriap.), p. 61.
" *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 37.

"*Hab.* In Georgia, Floridaque Orientali."

"The mandibles are short, thick, and have a distinct basal tooth; the dental plates are elongated and widely separated; the teeth 8, minute but distinct. The basal joint of the posterior pair of legs much shorter than the second, which is twice as long as the succeeding joints. The lateral anal appendages deeply punctured. Preanal scale flat, with a median longitudinal sulcus and scattered punctures, with the margin straight."

I have never seen a specimen of this species.

* Linn. Trans., xix, p. 410.

Gen. 8. SCOLOPOCRYPTOPS, *Newp.**

Ocelli nulli, segmenta podophora 23, postremum angustum; segmentum cephalicum imbricatum. Labium edentulum. Antennæ 17 articulatæ.

Eyes none; feet-bearing segments, 23; the last narrow; cephalic segment imbricate. Labium edentate. Antennæ, 17 articulate.

S. SEXSPINOSA.

S. saturate aurantiaca; pedibus flavis, subcompressis; antennis flavis, interdum aurantiacis, pubescentibus; capite labio mandibulis scutis sternisque punctatis; segmento cephalico subovato; labii margine antico fere recto; scuto postremo angusto, longo; pedibus postremis elongatis, haud pilosis; articulo basali tibiali longiore, spina unica magna in superficie inferiore et altera minore mediana in margine superiore interno et rare altera articulari minutissima; appendicibus analibus lateralibus valde elongatis, profunde dense punctatis, singula spina apicali unica alteraque minutissima in angula superiore posteriore; squama preanali postice vix emarginata. (Fig. 12.)

Fig. 12.

Fig. 13.

Deep orange; feet yellow, somewhat compressed; antennæ yellow, sometimes orange, pubescent; head, labium, mandibles, scuta, and sterna punctate; cephalic segment subovate; anterior margin of the labium (Fig. 13) nearly straight; last scutum narrow, long; last feet elongate, not pilose; the basal joint longer than the tibial, with one large spine upon its inferior surface, and another smaller median on its inner superior margin, and rarely a third very small articular; lateral anal appendages very elongate, densely profoundly punctate, each with a single apical spine, and another very minute one upon their superior posterior angle; preanal scale posteriorly scarcely emarginate.

Cryptops sexspinosus, *Say*, Journ. Acad. Nat. Sci., ii, p. 112, 1821; Id. (Lequien ed.) Œuvres Entom. i, p. 24; Gervais, Ann Nat. Janvr., 1837, p. 51.
" " *Lucas*, Hist. Nat. Anim. Art., p. 547.
" " *Newport*, in Ann and Mag. Nat. Hist., xiii, p. 100.

Scolopocryp. sexspinosa, *Newport*, Linn. Trans., xix, p. 407.
" " *Gervais*, Apt. iv, p. 297, et Tabl. Myriap. Amer. (Exp. Ameriq. de Sud, part. sept.), p. 36.
" " *Wood*, Journ. A. N. S, 1863, p. 37.

In this species the superior spine of the lateral anal appendages is very minute, and occasionally present only on one side. The color varies from milk-white to a dark reddish orange. The lighter shades are found in those individuals which have recently shed their skins. The color given in the diagnosis may be considered as that which characterizes the species, being the one to which it finally attains. The inferior surfaces of the posterior

* Linn. Trans., vol. xix, pp. 275, 405

legs are marked with an elongate whitish blotch. The preanal scale is rather short, and much narrowed posteriorly. I have examined a number of specimens, and have found the articular spine in few. I recently observed an individual just completing the operation of shedding his skin. This was crowded back so as to cover only the last two or three segments, giving the animal a very peculiar appearance. He soon, however, with many contortions, drew himself out of the old garment. On examining it, I found that it contained the derm of the head and all its appendages, even to the maxillæ and maxillary palpi. The anterior portion of the skin was so torn as to show that the process of shedding probably commenced by the creature's withdrawing its head from its case, and then thrusting it out between some of the anterior sterna, completing the process by pushing the skin back with its legs aiding them by a peculiar wriggling motion. The exuvia has most of the posterior segments entire, showing that the occupant has been withdrawn from it like a hand from a glove. The animal is of a milk-white color, with the antennæ pubescent, and the lateral anal appendages not elongate and without spines. The lower spine on basal joint of last pair of legs is very small, and the upper one scarcely perceptible. I once had the pleasure of observing a female guarding the young. She laid on her side, with her body coiled around them, and, by a rapid, cilia-like action of her feet, would pass them along and arrange them to suit her. This species is one of the most common chilopods around Philadelphia. The Southern specimens are much larger, stouter, and more highly colored than those from colder regions. Length, 2 inches.

Hab. The Atlantic United States.

S. GRACILIS.

S. ferruginea; capite labioque leviter punctatis, segmento-cephalico subovato; antennis pubescentibus; labii margine antico modice angusto, lateribus obliquis apice emarginato et angulis acutis; pedibus flavis, subcompressis; scutis sternisque vix punctatis; pedibus postremis gracilibus, elongatis, singulo spinis duabus S. sexspinosæ illis similimis, articulo basali tibiali longiore, articulis tribus ultimis pubescentibus; appendicibus analibus lateralibus elongatis, rude punctatis, singula spina apicali unica (interdum bifida) alteraque minutissima in angulo superiore posteriore; squama preanali elongata, punctata, postice late emarginata. (Fig. 14.)

Ferruginous; head and labium lightly punctate, cephalic segment subovate; antennæ pubescent; anterior margin of the labium rather narrow, with oblique sides, emarginate apex, and acute angles; feet yellow, subcompressed; scuta and sterna scarcely punctate; last feet slender, elongate, each with two spines very similar to those of S. sexspinosa; basal joint longer than the tibial; three last joints pubescent; lateral anal appendages elongate, rudely punctate, each with a single apical spine (sometimes bifid), and another, very minute, upon the superior posterior angle; preanal scale elongate, punctate, posteriorly broadly emarginate.

S. GRACILIS, *Wood*, Journ. A. N. S., new series, 1863, vol. v, p. 38.

The color in all of our specimens is lighter and more ferruginous than the typical color

of *S. sexspinosa*, but further investigations may show that that of this form also darkens with age. The prebasilar fold is generally well marked. The scuto-episcutal sutures are distinct; the sterno-episternal absent; but a suture marking the line of coalescence of the primitive sterna is often very apparent. This species is closely allied to the preceding as well as to the following. It differs from both in the shape of the anterior margin of the labium (Fig. 14), in the scarcity of punctations on the body, and in the pubescence of the distal portion of the last pair of feet. The superior spine of the lateral anal appendages is perhaps a little larger than in *S. sexspinosa*, but certainly smaller than in *S. spinicauda*. The white blotches beneath the posterior feet are common to all the North American species. Length, 2 inches.

Fig. 14.

Hab Fort Tejon, California. S. Xantus.—Smithsonian Collection.

S. SPINICAUDA.

S. aurantiaca, polita; capite labio mandibulis sternisque profunde punctatis; segmento-cephalico subovato; antennis pubescentibus; labii margine antico lato, fere recto, medio vix emarginato; scutis modice rugosis, punctatis, marginibus lateralibus elevatis; pedibus postremis elongatis, graeilibus, spinis duabus S. sexspinosæ illis similimis, artieulo basali tibiali longiore; appendicibus analibus lateralibus valde elongatis, rude punctatis, singula spina apicali uniea alteraque in angulo posteriore superiore; squama preanali modice breve, postice rotundata, vix emarginata. (Fig. 15.)

Orange, polished; head, labium, mandibles, and sterna profoundly punctate; cephalic segment subovate; antennæ pubescent; anterior margin of the labium broad, almost straight, medianly scarcely emarginate; scuta moderately rugous, punctate, with elevated lateral margins; last feet elongate, slender, with two spines very similar to those of S. sexspinosa; basal joint longer than the tibial; lateral anal appendages very elongate, rudely punctate; each with a single apical spine, and another upon the posterior superior angle; preanal scale rather short, posteriorly rounded, scarcely emarginate.

S. SPINICAUDA, *Wood*, Journ. A. N. S., 1863, new series, vol. v, p. 39.

The head is deeply punctate. The scuta are somewhat rugous with the scuto-episcutal sutures traceable. The sterna are without any traces of sutures. The whole body is more or less deeply punctate. The superior posterior angle of the lateral anal appendages is slightly prolonged and armed with a rather small black spine, which is, however, considerably larger than in any other species known to me. The posterior legs are exactly like those of *S. sexspinosa*, Newp. Length, 2 inches.

Fig. 15.

Hab. Washington Territory, Oregon.—Drs. Cooper and Kennerly.—Smithsonian Collection.

S. LANATIPES.

S. aurantiaca; pedibus compressis, flavis; capite mandibulis labio sternisque minute punctatis; segmento cephalico subovato; labio medio emarginato fere sicut in S. gracile, margine antico rotundato; pedibus postremis modice robustis, singulo spinis duabus S. sexspinosæ illis similimis, articulo tibiali basali fere æquali; tibia tarso metatarsoque pubescentibus; appendicibus analibus lateralibus brevibus, rude punctatis, singula spina apicali alteraque minutissima in angulo superiore posteriore; squama preanali modice lata, convexa, margine postico interdum late emarginato. (Figs. 16, 17.)

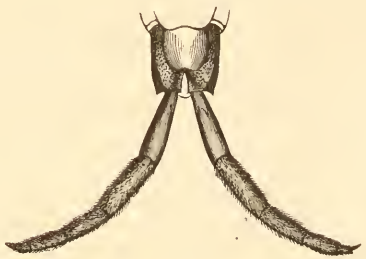
Orange; feet compressed, yellow; head, mandibles, labium, and sterna minutely punctate; cephalic segment subovate; labium medianly emarginate, almost as in S. gracile, the anterior margin rounded; last feet rather robust, each with two spines similar to those of S. sexspinosa; tibial and basal joints about equal; tibia, tarsus, and metatarsus pubescent; lateral anal appendages short, rudely punctate; each with an apical spine, and another very minute one upon the superior posterior angle; preanal scale rather broad, convex; its posterior margin sometimes broadly emarginate.

S. LANATIPES, *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 39.

This species is closely allied to *S. gracilis*, and it is possible that further specimens may show that the characters on which I rely in separating them vary. The differences are as follows: The labium (Fig. 16) closely resembles that of the first described species, but has the character not so well marked. The posterior pair of legs are more robust, with the tibia about equal to the femur in length, and pubescent. The lateral anal appendages are shorter and separated inferiorly by a much narrower space. The preanal scale is rather broader and more bent over the lateral anal appendages; and, finally, this species seems to attain to a larger size. Length, 2¼ inches.

Fig. 16.

Fig. 17.



Hab. California.—Smithsonian Collection.

FAM. V. GEOPHILIDÆ, *Leach.**

Segmenta numerosa, singulum subsegmentis duobus completis sed inæqualibus efformatum, et pedum par unicum gerens. Oculi nulli. Antennæ 14 articulatæ. Pedes anales breves, styliformes.

Segments numerous; each formed of two complete but unequal subsegments, and bearing a single pair of feet. Eyes wanting. Antennæ 14 articulate. Anal feet short, styliform.

* Linn. Trans., vol. xi.

The family character of this group which first attracts attention, is the large number of segments, each of which is composed of two unequal subsegments. The boundaries of the respective scuta of each pair of the latter are well marked by sutures, &c., but the sterna are completely consolidated. The head varies in form, size, &c., and furnishes the principal generic characters. The number of joints of the antennæ is fixed for the family, but nevertheless good specific, and even generic, characters, are derivable from these organs. The most important specific characters besides those before alluded to are founded upon, firstly, the peculiarities as to size, shape, proportion, &c., of the component portions of the head and its appendages; secondly, the color and form of the body, and the number of segments composing it; thirdly, the structure of the legs, especially of the last pair; and, finally, the markings and sutures of the scuta and sterna. I have never had an opportunity of examining very large suites of specimens, so as to determine positively the constancy of the various characters enumerated, but they probably do not vary a great deal.

Gen. 1. MECISTOCEPHALUS, *Newp.**

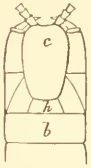
Segmentum cephalicum elongatum, angustum, latitudine plus duplo longius. Antennæ approximatæ, articulis obconicis. Subsegmentum prebasale sejunctum sed basale subbasaleque coalita. Mandibulæ magnæ, intus denticulatæ. (Fig. 18.)

Cephalic segment elongate, narrow, more than twice as long as broad. Antennæ approximate; articles obconic. Prebasal subsegment separate, but the basal and subbasal coalescent. Mandibles large, within denticulate.

M. fulvus

M. fulvus, politus; capite dilute aurantiaco, punctato, pilis longis rigidis paucis; segmento cephalico antice truncato, postice illico angustato et vix truncato; antennis longis, pilis longis rigidis multis; labio profunde punctato, antice emarginato, medio sulco impresso; mandibulis distincte punctatis, pilis rigidis paucis, quadridentatis; segmento anali piloso; pedibus pilis longis, paribus 57.

Fig. 18.



Fulvous, polished; head light orange, punctate, with a few long rigid hairs; cephalic segment anteriorly truncate; posteriorly rapidly narrowed and scarcely truncate; antennæ with many long rigid hairs; labium profoundly punctate, anteriorly emarginate, impressed with a median sulcus; mandibles distinctly punctate, with a few rigid hairs, quadridentate; anal segment pilose; feet with long hairs, 57 pairs.

M. fulvus, *Wood*, Journ. A. N. S., new series, 1863, vol. v, p. 41.

? Geophilus attenuatus, *Say*, Journ. A. N. S., 1st series, vol. ii.

The cephalic segment is scarcely narrowed at all, except at the posterior end, where it is rapidly contracted, being indeed rounded off. The body is slender and polished. The

* Proc. Zool. Society, December, 1842, p. 179.

scuto-episcutal and sterno-episternal sutures are very distinct, as well as those between the primitive sterna. I have found this species around Philadelphia, although not very abundantly. They appear to affect the inner bark or liber of decaying logs, especially that of the locust (*Robinia pseudacacia*, L.) I have, however, occasionally observed them under stones. It may possibly be *Geophilus attenuatus*, but that species can never be determined from Say's description.

M. MELANONOTUS.

M. parvus, gracilis, dilute aurantiacus; lineis duabus dorsalibus, latis, nigris, e capite ad segmentum penultimum ductis; capite sparse breve piloso; antennis sparse pilosis; labio, medio valde canaliculato, utrinque maculis tribus nigris; mandibulis intus vix denticulatis; lateribus nigro maculatis; scuto postremo dilute aurantiaco; suturis scuto-episcutalibus indistinctis; pedibus compressis, utrinque fere 50, pari postremo gracile; sternis suturis sterno-episternalibus et sulco mediano impressis.

Small, slender, light orange, with two broad, black, dorsal lines passing from head to penultimate segment; head sparsely shortly pilose; antennæ sparsely pilose; labium medianly strongly canaliculate, on each side, with three black maculæ; mandibles within scarcely denticulate; sides maculate with black; last scutum light orange; scuto-episcutal sutures indistinct; feet compressed, about 50 on each side; last pair slender; sterna impressed with the sterno-episternal sutures and a median sulcus.

M. MELANONOTUS, *Wood*, Journ. A. N. S., new series, 1863, vol. v, p. 41.

The two black bands are somewhat irregular and so broad that it would, perhaps, be correct to describe the dorsum as black, with a single median and two longitudinal light stripes. The labium has three black dots on each side, but I suspect that these are not constant. The mandibles have, on their inner edge, the rudiments of a denticule. I have had great difficulty in determining the number of feet, but think that fifty pairs is very near the mark.

There is in the Museum of the Academy a single specimen, collected in Georgia by Dr. John Le Conte. The length is about an inch.

M. LIMATUS.

M. aurantiacus?, venuste politus; capite appendicibusque saturate rubris, segmento cephalico ordinatim punctato, a fronte ordinatim angustato, segmento basali labioque lævibus; antennis sparse longe pilosis; labio valde emarginato, medio leviter canaliculato; mandibulis magnis, pilis longissimis, singula denticulationibus magnis, obtusis, 4; pedibus flavis?, pilosis, utrinque 43—44, postremis valde elongatis; scuto postremo elongato.

Orange, beautifully polished; head and appendages deep red; cephalic segment regularly punctate, regularly narrowed from the front; basal segment and labium smooth; antennæ sparsely long pilose; labium strongly emarginate, medianly lightly canaliculate; mandibles large, with very long hairs, each with four very large, obtuse denticules; feet yellow?, pilose; on each side 43—44; last pair very elongate; last scutum elongate.

M. LIMATUS, *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 42.

The alcohol in which the specimens were preserved having evaporated, they are in such a condition that I can only guess at the original color of the body and feet. The scuto-episcutal sutures are very distinct, as well as the subsegmental sutures of each fully-formed segment. The sterna are furnished with a median sulcus, deeply marked on the posterior, but obsolescent on the anterior portion of most of them. Length, 2¼ inches.

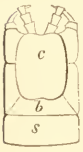
Hab. California.—Smithsonian Collection.

GENUS GEOPHILUS, *Leach*.*

Segmentum cephalicum subquadratum. Segmentum prebasale haud sejunctum, sed basali absolute coalitum. Segmenti basalis margo posticus antico multo longior. Segmentum subbasale sejunctum. Mandibulæ modicæ, interdum denticulatæ. Antennæ capite multo longiores, subapproximatæ, articulis inæqualibus. Labium plerumque emarginatum. (Fig. 19.)

Cephalic segment subquadrate. Prebasal segment not separate, but entirely coalescent with the basal. Posterior margin of the basal segment much longer than the anterior. Subbasal segment separate. Mandibles moderate, sometimes denticulate. Antennæ much longer than the head, subapproximate, their joints unequal. Labium generally emarginate.

Fig. 19.



GEOPHILUS LONGICORNES, *Gervais*, Apt. iv, p. 313.
NECROPHLEOPHAGUS, *Newport*, Proc. Zool. Soc., 1842, p. 180.
ARTHRONOMALUS, *Newport*, Linn. Trans., xix, p. 430; et Catal. Brit. Mus. Myriap., p. 83; haud Geophilus Newport et imitatores.

Since *Geophilus carpophagus* is the type of the original genus as instituted by Dr. Leach, the name Geophilus must be used for this section, to which *G. carpophagus* belongs, and not for that to which Mr. Newport applies it. Mr. Gervais does not adopt any of these genera, much to my surprise, for they appear to me as clearly and even beautifully defined as almost any that I have ever seen.

G. CEPHALICUS.

G. antice obscure aurantiacus, postice saturate olivaceus; capite magno, latissimo, saturate aurantiaco; segmento cephalico antice haud emarginato, sparse inordinatim punctato, marginibus lateralibus arcuatis; antennis modice longis, valde pilosis; labio sparse inordinatim punctato, medio canaliculato, antice emarginato; pedibus longis, flavescentibus, pilosis, utrinque 18; suturis scuto-episcutalibus conspicuis; superficie ventrali, antice aurantiaca, postice saturate olivacea; sternis suturis sterno-episternalibus et depressione mediana impressis.

Anteriorly obscure orange, posteriorly deep olive; head large, very broad, deep orange; cephalic segment

* Linn. Trans., vol. xi, p. 384.

anteriorly not emarginate, sparsely irregularly punctate; lateral margins arcuate; antennæ rather long, very pilose; labium sparsely irregularly punctate, medianly canaliculate, anteriorly emarginate; feet long, yellowish, pilose, on each side 48; scuto-episcutal sutures conspicuous; ventral surface anteriorly orange, posteriorly deep olive; sterna impressed with sterno-episternal sutures and a median depression.

G. CEPHALICUS, *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 44.

The body is very wide, as is also the head; the prebasilar segment of the latter is very strongly widened posteriorly. The mandibles have on the inner side one or two excessively minute denticulations. The anterior portion of the body is a dilute orange, but a short distance from the head a dark stripe commences, which, gradually widening, soon involves the whole surface in a very dark olive tint. The scuta are uneven and variously wrinkled. This form differs from the following in having the head very much broader, and the cephalic segment not emarginate anteriorly; the labium much more deeply canaliculate, and the number of segments not so great. Still it is possible that the differences are only sexual, and, having but one specimen of each, I cannot decide this point. The creature was caught near Philadelphia by my friend, Dr. Horn. I append a description of what may be the female of this species.

G. ——— ? G. saturate aurantiacus, robustus, politus; capite parvo; segmento cephalico parvo, antice leviter emarginato, marginibus lateralibus rotundatis; antennis modice longis, proximis pilosis, ultimis fere pubescentibus; mandibulis parvis, indistinctissime trideutatis; labio medio leviter canaliculato, antice leviter emarginato, sparse subprofunde punctato; pedibus brevibus, sparsissime pilosis, utrinque 51.

Deep orange, robust, polished; head small, cephalic segment small, anteriorly lightly emarginate, lateral margins rounded; antennæ rather long, proximally pilose, distally almost pubescent; mandibles small, very indistinctly tridentate; labium medianly lightly canaliculate, anteriorly lightly emarginate, sparsely subprofoundly punctate; feet short, very sparsely pilose, 51 on each side.

The sterno-episternal sutures are well marked, but not as deeply as the scuto-episcutal. The surface of most of the scuta is quite uneven, sometimes almost coarsely rugose. The dorsum has a very indistinct dark median stripe, more apparent on the posterior portion. Length, $1\frac{3}{4}$ inches.

Hab. Cumberland, Md.—Smithsonian Collection.

G. BREVICORNIS.

G. saturate aurantiacus, robustus, venuste politus; capite aurantiaco; segmento cephalico parvo, sparse subprofunde punctato; antennis pilosis, brevibus; mandibulis sparsissime pilosis, indistincte quadridentatis, singula denticulo unico (interdum duobus) modice magno; labio subprofunde punctato, antice emarginato, medio canaliculato; pedibus compressis, utrinque (? in mare) 55, (? in femina.) ?

Deep orange, robust, beautifully polished; head orange; cephalic segment small, sparsely subprofoundly punctate; antennæ short, pilose; mandibles very sparsely pilose, very indistinctly quadridentate, each with a single rather large tooth (sometimes two); labium subprofoundly punctate, anteriorly emarginate, medianly canaliculate; feet compressed, on each side (in male?) 55.

G. BREVICORNIS, *Wood*, Journ. A. N. S., 1863, p. 45.

The scuto-episcutal sutures are very distinct, as are also the sterno-episternal. The scuta generally are quite smooth. The body of each of the specimens is subcylindrical. I was at first disposed to consider these as the males of the following species, but it seems most probable that they are distinct. The principal differences are found, first, in the size of the cephalic segment and length of antennæ; second, in the punctations of the head; and finally, in the number of segments and robustness of body. Length, 2 inches.

Hab. Illinois, R. Kennicott; Texas, E. B. Andrews.—Smithsonian Collection.

G. LÆVIS.

G. aurantiacus, modice robustus; linea mediana dorsali, duplici, nigra, passim obsoleta, ad segmentum penultimum ducta; capite modice magno, leviter punctato, segmento basali breve; antennis sparse pilosis; labio saturate aurantiaco, nonnihil convexo, sparse leviter punctato, medio valde canaliculato, antice emarginato; mandibulis haud denticulatis; suturis scuto-episcutalibus modice distinctis; pedibus utrinque 53; superficie ventrali linea mediana unica, obsoleta, nigra; sternis suturis et depressione mediana impressis.

Orange, rather robust; dorsal median line double, black, here and there obsolete, reaching to the penultimate segment; head rather large, lightly punctate; basal segment short; antennæ sparsely pilose; labium deep orange, somewhat convex, sparsely lightly punctate, medianly strongly canaliculate, anteriorly emarginate; mandibles not denticulate; scuto-episcutal sutures rather distinct; feet on each side 53; ventral surface with a single, obsolete, black, median line; sterna impressed with sutures and a median depression.

G. LÆVIS, *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 44.

The cephalic segment has the sides moderately arched, with the anterior angles very strongly rounded. The dorsal median line is entirely wanting on the anterior portion of the body. The feet generally are without any hairs, but there are a few on some of them. There are two specimens in the Museum of the Academy, collected in Georgia by Dr. J. L. Le Conte.

G. BIPUNCTICEPS.

G. dilute aurantiacus, gracilis, venuste politus; segmento cephalico saturate aurantiaco, magno, antice leviter emarginato, et labio mandibulisque profunde punctatis; antennis modice longis, dense pilosis, antice fere pubescentibus; labio leviter emarginato (interdum obsolete), medio canaliculato; mandibulis magnis, crassis, interdum indistincte quadridentatis, singula denticulo unico (interdum duobus) modice magno; pedibus brevibus, sparsissime pilosis, utrinque (in mare?) 61, (in femina?) 63.

Light orange, slender, beautifully polished; cephalic segment deep orange, large, anteriorly slightly emarginate, together with the labium and mandibles copiously profoundly punctate; antennæ rather long, densely pilose; anteriorly almost pubescent; labium slightly (sometimes obsoletely) emarginate, medianly canalieulate; mandibles large, thick, sometimes indistinctly quadridentate, with a single (sometimes two) rather large tooth; feet short, very sparsely pilose, on each side (in male?) 61, (in female?) 63.

G. BIPUNCTICEPS, *Wood*, Journ. A. N. S., 1863, p. 45.

The surface of the head, under a very highly magnifying lens, has the appearance of being very densely and minutely punctate. This is very general in the family, but perhaps is a little marked in this species.

The general arrangement of the larger punctations on the cephalic segment is as follows: On each side of the posterior mesial portion there is a longitudinal series of punctations; on each side of the latter is a broad patch of the same, and anteriorly they are disposed in transverse series. No such method is discoverable in the preceding species. The color in all the specimens I have seen is somewhat lighter, and the body less robust, and perhaps more uniform than in *G. brevicornis*. The labium is of the same shade as the cephalic segment, but the basilar and subbasilar are colored like the body. The dorsum has occasionally an indistinct dark median stripe. The labial sulcus is more distinct anteriorly, but is sometimes quite obsolete. The scuto-episcutal and sterno-episternal sutures are very distinct. The sterna have a median groove. I have seen an individual, belonging to the collection of the Museum of Comparative Zoology, which has 65 pairs of feet on each side, but yet in other respects agrees entirely with the others.

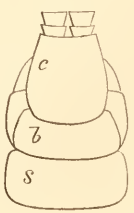
Hab. S. Illinois, R. Kennicott; Sonora, T. D. Graham.—Smithsonian Collection.

GENUS STRIGAMIA, *Gray*.

Antennæ approximatæ. Segmentum cephalicum parvum (Fig. 20 *c*), breve, plerumque subtriangulare, antice angustatum. Corpus depressum, antice attenuatum. Segmenta pedesque numerosæ.

Antennæ approximate. Cephalic segment small, short, generally subtriangular, anteriorly narrowed. Body depressed, anteriorly attenuate. Segments and feet numerous.

Fig. 20.



GEOPHILUS, *Leach*, partim.

STRIGAMIA, *Gray*, partim.

GEOPHILUS, *Newport*, et imitatores.

As I have before shown, the type of Leach's genus Geophilus belongs to the section Arthronomalus of Newport; and Arthronomalus must be replaced by Geophilus, and a new name given to Geophilus, Newport.

S. BOTHRIOPUS.

S. læte rubens, robusta; segmento cephalico sparse punctato, piloso; antennis pilosis, modice longis, haud acuminatis; mandibulis pilosis, intus dente magno, conico, acuto armatis; labio piloso, antice profunde emarginato, medio canaliculato; scutis pilosis, latis, brevibus, sine suturis; pedibus plerumque flavis, dense pilosis, utrinque 50; paris postremi coxis magnis et foveis minutis multis impressis; sternis suturis sterno-episternalibus et sulco medio obsoleto signatis.

Bright red, robust; cephalic segment sparsely punctate, pilose; antennæ pilose, moderately long, not acuminate; mandibles pilose, within armed with a large, conical, acute tooth; labium pilose, anteriorly profoundly emarginate, medianly canaliculate; scuta pilose, broad, short, without sutures; feet generally yellow, densely pilose, 50 on each side; last pair with the coxæ large, and impressed with many minute pits; sterna marked with sterno-episternal sutures and an obsolete median sulcus.

S. BOTHRIOPUS, *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 46.

The body is widest in the middle, but is much narrower at the anterior than at the posterior extremity. The last pair of feet are scarcely longer than the preceding. This species closely resembles *G. rubens*, Say, and may possibly prove identical with it, as the descriptions of that form are as usual quite meagre. Length, 1 inch.

Hab. Pennsylvania.

S. RUBENS.

S. "saturate aurantiaca; linea mediana dupliei nigra e segmento corporis primo ad penultimum ducta, segmento cephalico subcordato, antennis pilosis, labio mandibulisque lævigatis punctis raris, mandibulis nigris, pedum paribus 50. Long. unc. 1¼."

Deep orange, with a black double line passing from the first segment of the body to the penultimate; cephalic segment subcordate; antennæ pilose; labium and mandibles smooth, rarely punctate; mandibles black; pairs of feet 50. Length 1¼ inches.

GEOPHILUS RUBENS, *Say*, Journ. Acad. Nat. Sci., Philada., 1st series, vol. ii; Œuvr. Entom. i, p. 25.
" " *Gervais*, in Ann. Sci. Nat., 1837, p. 52; Apt. iv, p. 320.
" " *Lucas*, Hist. Nat. Anim. Art., p. 549.
" " *Newport*, Ann. and Mag. Nat. Hist., xiii, p. 101; Linn. Trans., xix, p. 435; Catal. Brit. Mus. Myriapoda, p. 87.

"*Hab.* In America Boreali."

Species mihi ignota.

S. FULVA.

S. fulvo-aurantiaca, polita; corpore antice attenuato; capite parvo; segmento cephalico subtriangulare, impunctato; antennis modice longis, filiformibus, haud acuminatis, sparse pilosis, articulis obconicis; mandibulis brevibus, crassis, singula denticulo modice magno conico; labio breve, antice medio valde emarginato, impunctato; scutis interdum linea media obsoletissima; pedibus modice longis, pilosis, gracilibus, cylindricis, utrinque 47; pari pos-

tremo (in mare ?) robusto, breve acuminato, articulis obconicis; sternis suturis sterno-episternalibus et sulco mediano lato impressis.

Yellowish orange, polished; body anteriorly attenuate; head small; cephalic segment subtriangular, impunctate; antennæ moderately long, filiform, not acuminate, sparsely pilose, joints obconic; mandibles short, thick, each with a rather large, conical denticule; labium short; anteriorly very emarginate, impunctate; scuta sometimes with a very obsolete median line; feet rather long, pilose, slender, cylindrical, on each side 47; last pair (in male ?) robust, shortly acuminate, articles obconic; sterna impressed with a broad, median sulcus and sterno-episternal sutures.

STRIGAMIA FULVA, *Sayer*, Proc. A. N. S., vol. viii, p. 109.
" " *Wood*, Journ. A. N. S., new series, 1863, vol. v, p. 47.

The color of this graceful little animal is an orange, approaching somewhat to fulvous. The antennæ are very thread-like. Some of the specimens have the last pair of feet very robust, with obconic joints. In others they are filiform and slender. The former are probably the males, the latter the females. I have, however, never been able to entirely satisfy myself as to this, owing to the great difficulty of dissection. The median linear depressions in the sterna are often dilated in their centre.

Hab. Illinois, Pennsylvania, &c.

S. BIDENS.

S. aurantiaca, venuste polita; segmento cephalico triangulare, antice truncato, sparse late punctato, margine antico postico nonnihil latiore; antennis brevibus, filiformibus, articulis obconicis; labio sparse late punctato, sulco obsoleto, margine antico denticulis duobus obsoletis obtusis armato; mandibulis intus minute unidenticulatis; suturis scuto-episcutalibus nullis; pedibus utrinque 76, cylindricis, paris postremi coxis magnis, foveis signatis; sternis suturis sterno-episternalibus et sulco mediano impressis; squama preanali convexa.

Orange, beautifully polished; cephalic segment triangular, anteriorly truncate, sparsely broadly punctate; the anterior margin somewhat broader than the posterior; antennæ short, filiform, their joints obconical; labium sparsely broadly punctate, sulcus obsolete, anterior margin armed sometimes with two obtuse, obsolete denticules; mandibles within minutely unidenticulate; scuto-episcutal sutures absent; feet on each side 76, cylindrical; coxæ of last pair large and marked with little pits; sterna impressed with sterno episternal sutures and a median sulcus; preanal scale convex.

S. BIDENS, *Wood*, Journ. A. N. S., new series, 1863, vol. v, p. 47.

The coxæ of the last pair of feet are very large. Their inferior surface is convex, and indented with from twenty to thirty small, round pits, irregularly arranged in rows. The remainder of the feet are, in our specimen, slender. I presume that the above character is persistent in both sexes, but cannot be certain on this point. There is a single specimen in the Museum of the Academy, labelled as having been found near Philadelphia by Joseph Leidy, M.D. I have never met with it whilst collecting. The length is about an inch and a half.

S. WHITEI.

S. "capite aurantiaco, corpore flavo-virente, segmento cephalico brevi subcordato, antennis nudis, moniliformibus, labio leviter longitudinaliter eristato, utrinque obliquè sulcato, pedum paribus 74. Long. unc. 1¼."

Head orange; body yellowish green. Cephalic segment short, subcordate; antennæ bare, moniliform; labium lightly longitudinally crested; on each side obliquely sulcate; pairs of feet 74. Length, 1¼ inches.

GEOPHILUS WHITEI, *Newport*, Linn. Trans., xix, p. 436.
" " *Gervais*, Apteres, iv, p. 321.

"*Hab.* In America Boreali."

Species mihi ignota.

G. ATTENUATUS, *Say*, Journ. Acad. Nat. Sci, 1st series, vol. ii, p. 114.

I have not been able to learn anything as to what species Mr. Say referred in his description, which throws no light on the subject; possibly it belonged to the genus Mecistocephalus.

S. WALKERI, sp. nov.

S. aurantiaca; capite parvo, sparse leviter punctato; mandibulis magnis, singula dente magno unico armata; scutis sine suturis; suturis sterno-episternalibus distinctis; pedibus utrinque 64; paris postremi coxis magnis, foveis minutis multis impressis.

Orange, head small, sparsely lightly punctate; mandibles large, each armed with a single large tooth; scuta without sutures; sterno-episternal sutures distinct; feet on each side 64; coxæ of the last pair large, impressed with many minute pits.

The head is small and of a more reddish tint than the body. The antennæ are of medium length, filiform, not at all clavate, and very sparsely minutely pilose. The body narrows much more gradually and somewhat more decidedly anteriorly than posteriorly. The last pair of legs in the single specimen are small and slender; their coxæ are large and pitted. Many of the sterna have three more or less obsolete depressions on their anterior portion, and two larger ones on their posterior; on some of them there is a longitudinal mesial groove. I would dedicate this species to my friend and student, Robert J. Walker, whose untiring energy in collecting has aided me so much in the preparation of this monograph.

Hab. Western Pennsylvania.—R. J. Walker.—Smithsonian Collection.

S. LEVIPES.

S. aurantiaca, robusta; capite modice magno, sparse piloso; segmento basilari margine antico postico nonnihil

latiore; mandibulis magnis, singula intus denticulo magno acuto armata; dente mandibulari, gracile, longo; scutis latis, brevibus, suturis scuto-episcutalibus nullis; pedibus modice longis, utrinque 69, pari postremo—(in mare?) longo, valde incrassato, illico acuminato, articulis obconicis—(in femina?), parvo, gracile, articulis subcylindricis; suturis sterno-episternalibus distinctis; squama preanali postice valde angustata.

Orange, robust; head rather large, sparsely pilose; anterior margin of basilar segment somewhat greater than posterior; mandibles large,—each armed on inside with a large, acute, denticule; mandibular tooth, slender, long; scuta broad, short; scuto-episcutal sutures absent; feet rather long, on each side 69; last pair—(in male?) long, very much thickened, rapidly acuminate, articles obconic—(in female?), small, slender, articles subcylindrical; sterno-episternal sutures distinct; preanal scale posteriorly very much narrowed.

S. LÆVIPES, *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 48.

One of the specimens has the last pair of legs very thick and long and vertically compressed. They are composed of eight joints, all of which are obconic except the last, which is very short and rapidly acuminate. This individual is probably the male. The other, the female, has the hindmost legs very slender, with the coxal joint proportionally very much larger than in the male.

Hab. Georgia.—Museum of Academy; Dr. J. L. Le Conte.

S. TÆNIOPSIS.

S. dilute fulva; corpore valde depresso, modice lato, antice leviter angustato; capite magno; segmento cephalico subtriangulare; antennis brevibus, moniliformibus, postice leviter depressis, crassis, antice cylindricis, haud acuminatis, pilis brevissimis mollibus paucis; labio breve, lato, antice obsolete bidentato, sulco mediano leviter impresso; mandibulis crassis; scutis brevissimis, sine suturis sed interdum linea mediana obscura; sternis brevissimis, singulo depressione submediana ovata, in corpore antico conspicuissima; pedibus brevibus, crassis, cylindricis, haud pilosis, utrinque 141, pari postremo (in femina?) gracile, breve. Long. une. $4\frac{3}{4}$.

Light yellow; body very depressed, rather broad, anteriorly slightly narrowed; head large; cephalic segment subtriangular; antennæ short, moniliform, posteriorly slightly depressed, thick, anteriorly cylindrical, not acuminate, with a few soft, very short hairs; labium short, broad, anteriorly obsoletely bidentate, impressed with a slightly pronounced median sulcus; mandibles thick; scuta very short, without sutures, but with sometimes an obscure median line; sterna very short, each with a single submedian ovate depression, most conspicuous on the anterior portion of the body; feet short, thick, cylindrical, not pilose, on each side 141, last pair (in female?) slender, short. Length, $4\frac{3}{4}$ inches.

S. TÆNIOPSIS, *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 48.

In the single specimen the color is very light, but originally may possibly have been an orange. The body is almost destitute of polish. The epimeral plates are very large. I am indebted to Dr. J. L. Le Conte for the specimen, which he captured in the mountains of Georgia.

S. MACULATICEPS.

S. sŏrdide aurantiaca, polita; corpore robusto, subsemicylindrico, antice modice attenuato; capite modice parvo, obscure saturate rubro, minute albomaculato, in lateribus sparse piloso; antennis longis, leviter pubescentibus, haud acuminatis; mandibulis crassis, obscure quadridentatis, pilis paucis; denticulo antico utrinque magno, conico; labio impunctato, antice vix emarginato, medio canaliculato; pedibus modice longis, gracilibus, subcompressis, utrinque 77, et superficie ventrali sordide flavis; scutis lævibus sine suturis; sternis lævibus, suturis sterno-episternalibus valde impressis et plerumque postice depressionum subovatarum transversarum pari; pedibus postremis ("stylis analibus") (in mare solum?) robustissimis, supra subcomplanatis, subtus convexis, acuminatis.

Dirty orange, polished; body robust, subsemicylindrical, anteriorly moderately attenuate; head rather small, obscurely deep red, minutely spotted with white, sparsely pilose on the sides; antennæ long, lightly pubescent, not acuminate; mandibles thick, obscurely quadridentate, with a few hairs; anterior denticule on each side large, conical; labium impunctate, anteriorly scarcely emarginate, medianly canaliculate; feet rather long, slender, subcompressed, on each side 77, together with the ventral surface dirty yellow; scuta smooth, without sutures; sterna smooth, strongly impressed with the sterno-episternal sutures, and generally with a pair of irregularly ovate, transverse depressions; last pair of feet ("anal styles") (in male only?) very robust, above subcomplanate, below convex, acuminate.

S. MACULATICEPS, *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 48.

The cephalic segment is slightly narrowed anteriorly, and the upper surface of the whole head is marked with very small whitish dots. The anterior and posterior extremities of the body are perhaps a little darker in color than the intervening portion. The inferior aspect of the head is of the same color as the superior, contrasting with the under surface of the body. Near the posterior border of each sterna there is a pair of subequal oval transverse depressions. The legs are almost destitute of hair, having occasionally, however, a few very short ones. Length, 2½ inches.

Hab. Upper Colorado. H. B. Mollhausen.—Smithsonian Collection.

S. LATICEPS.

S. dilute aurantiaca; capite magno, impunctato; segmento cephalico lato, breve, transverso, quinqueangulato, segmentis basali subbasalique marginibus curvatis et angulis anticis prolongatis; antennis brevibus, crassis, cylindricis, antice pubescentibus; labio breve, nonnihil convexo, haud canaliculato; mandibulis parvis, singula intus denticulo obtuso indistincto; pedibus subcompressis, gracilibus, utrinque 81, pari postremo (in mare solum?) nonnihil crasso, cylindrico, haud acuminato, coxis magnis; sternis depressione lineari-ovata transversa et suturis sterno-episternalibus signatis; squama preanali valde canaliculata, postice valde emarginata, angulis posticis subacutis.

Light orange; head large, impunctate; cephalic segment broad, short, transverse, quinqueangulate; basal and subbasal segments with their margins curved and anterior angles prolonged; antennæ short, thick, cylindrical, anteriorly pubescent; labium short, somewhat convex, not canaliculate; mandibles small, each with an indistinct obtuse tooth on inner surface; feet subcompressed, slender, 81 on each side; last pair (in male alone?) somewhat thickened, cylindrical, not acuminate, with large coxæ; sterna marked with a transverse linear-ovate depression

and sterno-episternal sutures; preanal scale deeply canaliculate, posteriorly strongly emarginate, posterior angles subacute. Length, 3 inches.

S. LATICEPS, *Wood*, Journ. A. N. S., new series, 1863, vol. v, p. 49.

The anterior of the two scuta covering each segment is very distinct from the other, and is much wider at its posterior than at its anterior margin. The posterior has its lateral margins arcuate but not elevated. The scuto-episcutal sutures are very distinct. Posteriorly there is an obsolete dark median dorsal line. Length, 3 inches.

Hab. Texas.—Museum of Comparative Zoology; George Stolley, Esq.

S. CEPHALICA.

S. sordide dilute brunnea, superficie dorsali lineis pullis duabus, obsoletis; corpore antice leviter sed postice illico valdeque angustato; capite magno; segmento cephalico subtriangulare, impunctato, basali postice leviter dilatato; antennis brevissimis, latis, depressis, haud pilosis, articulis brevissimis, nonnihil quadratis; labio impunctato, medio canaliculato, antice leviter emarginato; mandibulis crassis, haud denticulatis; suturis scuto-episcutalibus nonnihil obsoletis; pedibus gracilibus, modice brevibus, haud pilosis, utrinque 75, pari postremo (in femina solum ?) parvo, gracile; sternis suturis sterno-episternalibus et sulco mediano impressis.

Dirty light brown; dorsal surface with two obsolete, blackish lines; body anterior slightly, but posteriorly quickly and strongly narrowed; head large; cephalic segment subtriangular, impunctate; basal posteriorly slightly dilated; antennæ very short, broad, depressed, not pilose, with very short, somewhat quadrate joints; labium impunctate, medianly canaliculate, anteriorly lightly emarginate; mandibles thick, not denticulate; scuto-episcutal sutures somewhat obsolete; feet slender, rather short, not pilose, on each side 75; last pair (in female only ?) small, slender; sterna impressed with sterno-episternal sutures and a median sulcus.

S. CEPHALICA, *Wood*, Journ. A. N. S., new series, 1863, vol. v, p. 49.

The two dark lines on the dorsum are very obscure, and are evanescent anteriorly. The cephalic segment is quite acute anteriorly. The legs are rather lighter in color than the body, and are shorter than in the preceding species. Length, 2¼ inches.

Hab. California.

S. PARVICEPS.

S. saturate aurantiaca, polita; corpore antice valde sed postice leviter angustato; capite parvo, segmento cephalico suborbiculare, impunctato; antennis modice longis, filiformibus, haud acuminatis, sparse pilosis, articulis nonnihil obconicis; mandibulis crassis, sparse breve pilosis, obscure tridenticulatis, denticulo antico utrinque magno conico acuto; labio lato, breve, impunctato, vix emarginato, sulco mediano obscure impresso; scutis sine suturis; pedibus modice longis, gracilibus, pilis brevibus paucis, et superficie ventrali sordide aurantiacis, utrinque 71, pari postremo (in femina solum ?) parvo, gracile; sternis suturis sterno-episternalibus et sulco mediano impressis.

Deep orange, polished; body anteriorly strongly, but posteriorly slightly narrowed; head small; cephalic segment suborbicular, impunctate; antennæ rather long, filiform, not acuminate, sparsely pilose, articles somewhat obconic; mandibles thick, sparsely shortly pilose, obscurely tridenticulate; anterior denticule on each side, large, conical acute; labium broad, short, impunctate, scarcely emarginate, impressed with an obscure median sulcus; scuta without sutures; feet rather long, slender, with a few short hairs, together with the ventral surface dirty orange, on each side 71; last pair (in female only?) small, slender; sterna impressed with the sterno-episternal sutures and a median sulcus.

S. PARVICEPS, *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 49.

In the only specimen that I have seen the mandibles are perfect, with the exception that they lack the mandibular tooth, probably the result of an accident; but it is rather curious that both should be lost and the remainder of mandibles be uninjured. The head appears to be destitute of punctations. Length, $2\frac{1}{4}$ inches.

Hab. California.—Smithsonian Collection.

S. EPILEPTICA.

S. polita; corpore antice valde sed postice modice angustato, supra saturate sed subtus dilute aurantiaco; capite parvo; segmento cephalico suborbiculare, albomaculato; segmento basali subbasali longiore; antennis longis, filiformibus, haud acuminatis, partim pubescentibus, articulis nonnihil obconicis; mandibulis crassis, distincte tridenticulatis, denticulo antico magno, conico, acuto; labio convexo, copiose minute albomaculato, antice leviter emarginato, sulco mediano impresso; scutis longis, latis, sine suturis; pedibus gracilibus, modice longis, dilute aurantiacis, utrinque 81; pari postremo (in femina solum?) parvo, gracile, haud antenniforme; sternis suturis sterno-episternalibus et sulco mediano impressis. (Figs. 21, 22.)

Fig. 21.

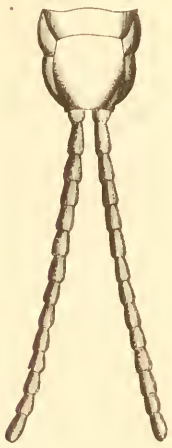


Fig. 22.

Polished; body anteriorly strongly, but posteriorly moderately narrowed. Above deep, below dilute orange; cephalic segment suborbicular, sparsely minutely spotted with white; basal segment longer than the subbasal; antennæ long, filiform, not acuminate, partly pubescent; joints somewhat obconic; mandibles thick, distinctly tridenticulate; anterior denticule large, conical, acute; labium convex, copiously minutely spotted with white; anteriorly somewhat emarginate, impressed with a median sulcus; scuta long, broad, without sutures; feet slender, rather long, light orange, on each side 81; last pair (in female only?) small, slender, not antenniform; sterna impressed with sterno-episternal sutures and a median sulcus.

S. EPILEPTICA, *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 49.

This is much the largest Geophilid as yet found within our limits. The greatest breadth of the scuta is about two lines. The white dots on its head are very minute, resembling punctations. Length, 5½ inches.

Hab. Oregon. Neighborhood of Puget's Sound; Dr. Kennerly.—Smithsonian Collection.

S. CHIONOPHILA.

S. aurantiaca, gracilis, parva, venuste polita; segmento cephalico fere subquadrato, postice medio canaliculato; antennis pilosis, haud acuminatis, articulis (ultimo excepto) obconicis; mandibulis dente modico in margine interno armatis; suturis scuto-episcutalibus interdum obsoletis sed plerumque distinctis; pedibus pilosis, utrinque 43; pari postremo (in femina solum?) gracile, parvo; sternis vel canaliculatis vel depressione subcirculare notatis et suturis sterno-episternalibus valde impressis.

Orange, slender, small, beautifully polished; cephalic segment almost subquadrate, posteriorly medianly canaliculate; antennæ pilose, not acuminate; their joints (the distal one excepted) obconic; mandibles armed with a moderate denticule upon their internal margin; scuto-episcutal sutures sometimes obsolete, but generally distinct; feet pilose, on each side 43; last pair (in female alone?) slender, small; sterna either canaliculate or marked with a subcircular depression, and impressed with the sterno-episternal sutures.

S. CHIONOPHILA, *Wood*, Journ. A. N. S., new series, vol. v, 1863, p. 50.

The distal joint of the filiform antennæ is large and cylindrical, causing them to appear somewhat clavate. This species is a very interesting one, from the fact of its inhabiting a region so near the Arctic circle. Its diminutiveness shows that the Myriapoda form no exception to the general decrease in size observable among the lower animals as we leave the Equator. Length, ¾ inch.

Hab. Fort Simpson, Red River of the North; R. Kennicott.—Smithsonian Collection.

ORD. II. DIPLOPODA.

Corporis segmenta, singulum pedum paribus duobus instructum.

Segments of the body numerous; each furnished with two pairs of feet.

The body among the Diplopoda is more or less cylindrical, not flat and parallelopipedal, as in the Chilopoda. Neither of the subsegments composing a segment is atrophied, nor are their appendages; consequently each segment is provided with two pairs of legs. These have coxæ, femora, tibial, tarsal, and metatarsal joints. The coxæ of the last pair are never hypertrophied, as in the first order. The organs of special sense are not well developed. The eyes are frequently altogether absent; when they do exist, they are generally numerous, scarcely at all elevated above the surface, and collected in patches near

the base of the antennæ. The latter are generally short, thick, and clumsy, indeed in many genera they seem almost incapable of fulfilling any physiological function.

The external organs of nutrition are arranged in accordance with two types or plans. The one is adapted for feeding upon decaying vegetable matter, the other for the imbibition of liquid or semi-liquid food. In each there is so much coalescing and atrophying of parts that it is impossible to trace in the adult their homologies.

Iulus marginatus may be taken as an example of the first type. On examining the mouth of this myriapod, it will be found that the anterior or upper boundary is formed by the thin edge of the head; whilst the lower is the edge of a flat plate (Fig. 23), which forms the lower surface of the buccal cavity and throat. Working between this plate and the head are the jaws. These are very massive, and appear to consist of three joints; the two proximal of these are firmly connected, almost coalescent, whilst the distal is united to them by a membranous suture. The basal or proximal part articulates with the head just beneath and posterior to the ocelli, and is so placed as to have its long axis nearly parallel with that of the body. Near to its distal extremity the mandibles curve abruptly at right angles, so that the distal joints (Fig. 24) present two opposing surfaces or edges. These are firm, hard, and more or less thin and acute. They are armed with more or less strongly pronounced conical elevations or teeth, and seem well adapted for breaking and cutting off substances.

Fig. 23.

Fig. 24.

The floor of the mouth and under surface of the head is formed by a single thin flat plate (Fig. 23) composed of several closely united pieces. The outer anterior part is formed on each side by a triangular piece, from which project a pair of short, blunt processes.

In the *sugentia*, or second division, the parts about the mouth are all consolidated into a tube-like projection or beak of greater or lesser length.

Sub Ord. CHILOGNATHA.

Caput magnum, nonnihil cuneiforme. Mandibula maxima.

Head large, somewhat cuneiform. Mandibles very large.

The American species of this suborder, which have come under the author's notice, are in this paper arranged in three families, the Iulidæ, Lysiopetalidæ, and Polydesmidæ. A fourth, the Polyxenidæ, is said to be represented. Of these, the first two constitute the Iulidæ of Newport, they themselves ranking as subfamilies in the classification of that authority. If any force is to be given to the characters employed by Mr. Gray, his

family Craspedosomidæ includes both the subfamilies Lysiopetalidæ and Craspedosomidæ of Newport, although these are placed by the latter in different families. Whether these two groups belong together or not I cannot say, since I have never seen a specimen of the Craspedosomidæ of Newport. The Lysiopetalidæ, as defined in this memoir, includes that of Mr. Newport, but whether it reaches still further I cannot certainly say, on account of the differences in the characters used. The distinguishing mark of the Polydesmidæ is commonly supposed to be the possession of lateral lamina or side plates. Now, on glancing over a selected series of specimens, it will be seen that there is a regular gradation in size, from the largest lateral lamina to those which are merely rudimentary. Further, in some species of Lysiopetalidæ, the whole surface is strongly keeled, and the keel corresponding in position to the lateral lamina is so enlarged as to equal in size the smaller lateral lamina. The groups thus coming, as regards this character, in contact, or at least very close proximity.

If a segment of a species of each of the three groups is examined, it will be found that fixed characters can be drawn from the varying development of the sterna of the subsegments. In the Polydesmidæ both of the sterna are thoroughly developed, so that the segment constitutes a perfect ring. In the Julidæ the sterna of the posterior subsegments are atrophied, so that each segment is emarginate posteriorly. In the Craspedosomidæ both sterna are reduced to their minimum, and not consolidated with the scuta, so that the ring is left altogether incomplete. I have placed the Polydesmidæ below instead of above the other families, because they have both the organs of special sense and the locomotory apparatus least developed.

Ord. LYSIOPETALIDÆ.

Sterna minima, cum scutis haud conjuncta.

Sterna very small, not conjoined with the scuta.

There is much obscurity hanging around the genera of this family; so much that, in the absence of known representatives and types, it is impossible to clear it up.

Genera, with precisely opposite characters, families widely separated, have been tortured out of what claims to be one species.

In "Europe Méridionale," M. Risso described a genus under the name of Calipus, the type of which is a European species, which, M. Gervais says, belongs to the genus Lysiopetalum. Risso's generic characters apply nearly equally well to any Chilognath. Yet, if Gervais is right, his name should have the preference. In Recueil (p. 42), M. Brandt indicated the genus Lysiopetalum, and afterwards (p. 90), the genus Spirostrephon. The description of the former is mostly made up of what I consider family cha-

racters; that of the latter is founded on an entirely distinct set—is, in truth, a description comparative not with the allied genera, but with those of the Iulidæ. In "Ann. and Mag. Nat. Hist.," Mr. Newport described a genus Platops. His description has apparently not the slightest relation to that of M. Brandt; but Platops seems to be the same as Spirostrephon, from the fact that the type of the latter is one of Mr. Newport's new species. Mr Gervais unites Lysiopetalum and Platops together, whether correctly or not I cannot say, not having seen enough specimens. Although with my present light it appears probable that they are one, yet, out of deference to the opinions of Messrs. Brandt and Newport, they are in this paper considered distinct.

Genus SPIROSTREPHON.*

S. LACTARIUS.

S. brunneus, lineis rufo-brunneis tribus ornatus; scutis valde et arete carinatis; segmentis 59.

Brown, ornamented with three reddish brown lines; scuta closely and strongly keeled; segments 59.

Var. Nigro brunneus, haud lineatus.

Var. Blackish brown, not lineate.

JULUS LACTARIUS, *Say*, Journ. A. N. S., 1st series, vol. ii, p. 104.
PLATOPS LINEATUS, *Newport*, Ann. and Mag. Nat. Hist., vol. xiii, p. 267.
SPIROSTREPHON LACTARIUS, *Brandt*, Recueil, p. 90.
LYSIOPETALUM LINEATUM, *Gervais*, Apteres, vol. iv, p. 133.
CAMBALA LACTARIUS, " " " p. 134; Exped. L'Amer. du Sud (Castelneau), Myriap., p. 17.
REASIA SPINOSA, *Sager*, Proc. A. N. S., 1856, p. 109.
"REANA CHINOSA, *Sager*," *Gervais*, Exped. L'Amer. du Sud (Castelneau), Myriap., p. 14.

Haud. "JULUS LACTARIUS, *Say*;" *Gray* et *Newport*.
CAMBALA LACTARIUS, *Gray*, Griff., Animal Kingdom Ins., pl. 135, fig. 2.
" " *Newport*, Ann. and Mag. Nat. Hist., vol. xiii, p. 266.

The color in this species varies from a very light to a very dark brown. The ornamental lines are generally very distinct, but may be entirely absent, especially in those specimens which have a blackish tint.

The head is somewhat emarginate in its superior posterior border. The vertex is dark colored, convex, medianly obsoletely canaliculate, and copiously minutely distinctly punctate. The anterior aspect is rather narrow, lighter colored, and provided with numerous

* Brandt.

short hairs. Its border is rather deeply emarginate. The eyes are in triangular patches, and are quite prominent. The antennæ are rather long, filiform, pilose, and not at all clavate. The first scutum has its transverse diameter scarcely equal to that of the head. The anterior portion of its surface is smooth, the posterior strongly carinate. The surface of the other scuta is divisible into three regions. The anterior of these is the broader, and is strongly and closely keeled. The middle is the least in size, and is ornamented with closely set small keels, entirely evanescent on the sides. The posterior is not at all keeled, but is chased with curved, impressed lines. The keels at the position of the lateral pores are much enlarged and thickened. On the surface above them there are about seventeen keels to a segment. The last scutum is not at all pointed. The posterior portion of the body is more or less pilose. The preanal scale is broadly triangular.

The female appendages appear to consist of a pair of somewhat conical flattened bodies, with rounded summits, surmounted by a curved, rather thick, process, which springs from the base. The male appendages (Fig. 25) consist of two basal, irregular pieces, closely conjoined, and two processes arising from each of them. The smaller of these is short, broad, rather straight and acute at its end. The larger is composed of two parts. The shaft is irregular and proximally curved at right angles to itself; from its distal end proceeds at a sharp angle a curiously curved, somewhat spoon-shaped, portion; from near the point of junction of these arise a pair of subcylindrical, nearly parallel, curved processes. One of these is frequently distally bifid.

Fig. 25.

Mr. Say, in his description of Iulus lactarius, uses the following expression: "Eyes *triangular*, granulated, deep black." In the Annals and Magazine Nat. Hist., vol. xiii, p. 266, Mr. Newport states that there were in the British Museum the original specimens sent by Mr. Say to Dr. Leach as Iulus lactarius, and that their eyes were arranged in linear patches. He there indicates a new genus, under the name of *Cambala*, with Iulus lactarius, Say, for its type, and characterizes it by its *linear* eye-patches. On the other hand, Mr. Brandt (Recueil) identifies certain specimens with triangular eye-patches in the Museum at Berlin as I. lactarius of Say. M. Gervais, reviewing this, concludes that Mr. Newport must have been mistaken, that his Cambala lactarius is not I. lactarius of Say. I have seen very numerous specimens from different localities agreeing in all respects with Mr. Say's description, but never one with linear eye-patches. Again, I find that Mr. Newport's description of Platops lineatus coincides with the specimens which I identify as I. lactarius of Say. Now, can there be any doubt that, through the carelessness of some one, the label had been transferred to the bottle of specimens which Mr. Newport studied, and that really his P. lineatus was founded on the type specimens of Say's spe-

cies? I have examined the types of Reasia spinosa, and there can be no doubt as to its identity.

I have seen a single specimen, a female, labelled as coming from New Grenada, which apparently belongs to this species.

Hab. Eastern United States.

S. CÆSIOANNULATUS.

S. brunneus, cæsioannulatus; segmentis 32, singulo serie punctorum distantum ornato.

S. brown, annulate with gray; segments 32, each with a series of distant puncta.

The general color of this curious Myriapod is light brown, but on each scutum is a broad gray annulus. The anterior surface of the head is hollowed out at the position of the ocelli; in front of these the sides are straight and converging. The inferior margin is rather deeply emarginate. The basal portion of the mandibles on each side project, so that if a vertical section of the head through the middle were taken it would be an oval with its greater diameter transverse. The eyes are in strictly triangular patches, with remarkably straight sides. The scuta are so deeply canaliculate along their dorsal centre as to be almost divided into two parts. The dorsum is not perfectly rounded, but there is somewhat of a ridge or angle in the centre. Each scutum is furnished with a regular series of distant large puncta, or perhaps more properly, pores. Three cylindrical, transparent spinules, project from the posterior border of the last scutum. There is a single specimen, a female, in the Smithsonian Museum,—it measures about an inch in length, and was found by Mr. Robert J. Walker in Alleghany County, Pennsylvania. This species ought perhaps to be the type of a new genus; but, as I am unable to make out the generic characters in this family, it seems preferable to retain it in this for the present.

FAM. II. IULIDÆ.

Subsegmentorum posticorum sterna subnulla, subsegmentorum anticorum sterna modica et illa et haec cum scutis arcte conjuncta. Scuta laminis lateralibus haud instructa.

Sterna of the posterior subsegments almost absent, of the anterior moderate, both closely conjoined with the scuta. Scuta not furnished with lateral lamina.

The head in this family is moderately large, and generally has the organs of special sense well developed. The eyes are present in all our American species, arranged in variously shaped patches, near to the base of the antennæ. The latter are sometimes

long and filiform; but in the genus Spirobolus they are generally short and massive. The body is cylindrical and composed of very numerous segments, which are more or less imbricated. The line of conjunction of the two subsegments is almost, if not quite, always well marked. The organization of this family is more fitted for activity and their habits less sluggish than in the Polydesmidæ, although less so than in the Spirostrephonidæ. The coloration varies, some species being ornamented with annuli, others with stripes. The only surface markings, in our American species at least, consist of longitudinal channels, or flutings and punctations.

The American species are comprised in two genera, Iulus, Spirobolus. Some authors recognize a third genus, Uncigera, founded on the presence of a mucro or point on the posterior scutum. Now a suite of specimens shows this at once to be such a gradually developed character that it is almost impossible to say where the last scutum is simply acuminate, and where it is slightly mucronate. Besides, species which appear in every other respect to be very closely allied would be thrown into different genera, were this Uncigera to be recognized as such.

The specific characters are drawn: 1. From the number of segments composing the body. 2. From the coloration and surface markings. 3. From the last scutum. 4. From the genital appendages, besides other minor points, such as differences in the antennæ, shape of the head, &c.

The number of segments is apparently confined within a small limit in the adult of each species; but in applying this character, it must be remembered, that the young have less than the normal number. Where there is anything peculiar in the pattern of coloration, it appears to be persistent in the species. Surface markings more generally characterize small groups than individual species, yet are sometimes available even in closely allied forms. The possession of a mucro characterizes groups; whilst its size and its shape are often specific. As in all the other Diplopoda, each species has a peculiar and persistent form of the Genitalia, more marked in the male than in the female. Indeed a certain type of arrangement seems in this group to characterize a genus.

Genus IULUS.

Scutum primum magnum, lateribus in femina nonnihil productis. Scuti secundi latera haud producta.

Sides of the first scutum somewhat produced in the female. Sides of the second scutum not produced.

None of the North American species of this genus approach at all in size to the Spiroboli. The body is always slender, and seldom more than three inches in length. The head is distinct, and has the antennæ always more or less elongate and filiform, apparently

well adapted for active service. The second scutum is never produced forwards at the sides so as to abut against the head, as in Spirobolus. In all the species in which I have had an opportunity of examining sexes, the form of the first scutum distinguishes them with certainty. In the male its antero-posterior diameter is large, and there are well-marked lateral margins running nearly at right angles to the others. In the female the anterior posterior diameter is much less, but laterally the scutum is so produced that the anterior and posterior margins may in most cases be said to meet one another at an angle. The males are further distinguished by a peculiar alteration of the first pair of feet, which are transformed into a pair of very large, thick organs. The function of these is obscure, but possibly it may be connected with the union of the sexes, analogous to that of the "claspus" in some reptiles.

1. IMPRESSUS.

1. rubro-castaneus, linea dorsale nigra et maculæ nigræ seriebus lateralibus (interdum obsoletis) ornatus; antennis longis, filiformibus, pilosis, haud clavatis; scutorum lateribus canaliculatis; segmentis 52; mucrone parvo.

Reddish chestnut, ornamented with a black dorsal line, and a lateral series of black dots (sometimes obsolete); antennæ long, filiform, pilose, not clavate; sides of the scuta canaliculate; segments 52; mucro small.

1. IMPRESSUS, *Say*, Journ. A. N. S., 1st series, vol ii, p. 102.
" *Gervais*, Apteres, vol iv, p. 176; Exped. L'Amer. du Sud (Castelneau), Tabl. Myriap., p. 18; Brandt, Recueil, p. 84.

1. VENUSTUS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 10.

The general color of this species is reddish chestnut; frequently the red predominates so much that the individual is really flesh-colored, but occasionally the chestnut overcomes the other tint. The dorsal stripe is generally very distinct, especially on the posterior portion of the scuta. The eyes are triangular, and are connected by a dark band, which is often rather obscure. The anterior cephalic aspect is long and narrow, with its sides converging inferiorly. Its inferior border is fringed with a double row of short, distant hairs, and is medianly deeply emarginate, and 2—4 dentate. The scuta are ornamented, rarely with a white blotch on each side of the mesial line, but generally with two lateral black dots. The first scutum in the female has the anterior margin oblique as to the main axis of the body, and is prolonged laterally so as to form processes, mostly canaliculate, with a rounded border. In the male the anterior margin is at right angles to the axis of the body, and the lateral parallel to it, so that there are no processes. The male appendages consist of two main portions on each side. The outer and more conspicuous of these (Figs. 27, 28) is formed of a thin, very irregular plate, from whose base springs a short, clavate, cylindrical, distally pilose process. The inner portion (Fig. 26) is composed

of a long, very slender, almost setiform process, and a shorter straighter one. The former at its base is bent at right angles to itself; and distally it is somewhat spirally arched over the other.

The female (Fig. 29) appendages consist of two broad, robust, pilose processes, with a pair of very slender, almost filiform, feet-like bodies, springing from their conjunction and equalling them in length. The major portion of each appendage is composed of a single plate. This is folded on itself, so as to constitute an irregular, flattened cylinder, which is open at its end and along the outer edge. It presents on one aspect an unbroken, tolerably regular surface, but on the other is proximally abbreviated. Through the opening thus afforded projects a pair of subcircular, somewhat globose plates, fitting together much as the shells of a bivalve. The filiform processes are on the former surface. Length, 2 inches.

Fig. 26. Fig. 27. Fig. 28. Fig. 29.

Hab. Illinois. Smithsonian Institution.—R. Kennicott. Georgia. Coll. A. N. S.—Dr. J. L. Le Conte, U. S. A.

In the Kennicott collection I have seen a male *Iulus* very closely resembling the former, but differing so much in its genital appendages that it probably represents a distinct species. The outer of the two parts, forming each appendage, consists of a thin, flat, crooked, very irregular process, and a shorter, robust, pilose, and strongly clavate one. The former, proximally, is quite broad, and narrows from the base, but distally is but at a right angle to itself, and is rapidly contracted, so as to terminate in a nearly cylindrical crooked point. The main process (Fig. 30) of the inner portion is somewhat cylindrical proximally, but is distally expanded. At first bent at a right angle to itself, it next has the swan-neck curve, and is then bent at an acute angle to itself to be straight the remainder of its length. At this angle there is a minute sharp spine. Shielded, as it were, by this process, there is another, very slender and acute.

Fig. 30

It is most probable that *I. venustus*, Wood, is the species intended to be indicated by Mr. Say under the name of *impressus*, although his description is so meagre that it could be applied to other species. The locality would seem to fix it, however. Mr. Say's description is given below in full.

"Brown, a series of lateral black dots, beneath yellowish white; ultimate segments mucronate."

"Body cylindrical, emarginate, above brownish, beneath yellowish white, appearing glabrous; segments each with a lateral black spot, whitish lines and dots sometimes obso-

lete, a transverse series of longitudinal, abbreviated, obsolete, impressed lines; and beneath the stigmata with impressed, more distinct ones, ultimate segment mucronate, spiracles not prominent; eyes rather large, conspicuous, black; labrum yellowish white; antennæ brownish."

"A common species inhabiting under stones, and in humid situations; a variety occurs with a very distinct, acute, longitudinal, dorsal line, and variegated head."

I. PILOSISCUTA.

I. castaneo-brunneus maculæ nigræ (interdum obsoletæ) seriebus lateralibus ornatus; antennis longe pubescentibus; capitis margine antico modice emarginato, denticulato; segmentis 58; muerone parvissimo; scutis pilosis, singulo punctorum disjunctorum serie impresso.

Chestnut brown, ornamented with a lateral series of black dots (sometimes obsolete); antennæ pubescent; anterior margin of the head moderately emarginate, denticulate; segments 58; muero very small; scuta pilose, each impressed with a series of distant dots.

I. PILOSISCUTA, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 11.

The color of this species is a chestnut brown, sometimes mottled with light brown. The anterior aspect is beautifully but irregularly areolated with the latter color. The antennæ are moderately long, and have their dark joints tipped with white. There is a pair of coarse punctations on the vertex. Each scutum has a series of distinct punctations extending entirely around it; from these dots proceed little channels, obsolete on the forepart of the body, but gradually becoming strongly pronounced. The anterior portion of the body is sparsely, but the posterior densely, pilose. The anal scales are very rough. I have never seen a male, neither can I give a detailed account of the female appendages, but one portion of them consists of a pair of short, subcylindrical, rather robust and distally clavate processes.

Hab. Susquehanna County, Pennsylvania.—E. D. Cope, Esq.

I. EXIGUUS.

Corporis segmenta cum anali 31 ad 33. Pedum paria 51 ad 55. Oculi subrotundi. Antennæ pilosæ, subbreves, articulis apicalibus approximatis, subinerassatis, quoad colorem fusco nigricantes, articulorum apicibus albidis. Cinguli primi supra epunctati processus lateralis trigonus, modice acutus, subelongatus, apice incurvato, striis aliquot impressis notato, abdomen attingens. Segmenta reliqua dorsalia parte posteriore subtumida, convexa, quare corpus submoniliforme, striis subremotiusculis, grossiusculis, in dorso subobsoletis, in lateribus distinctis impressa. Penultimum cingulum satis insigne, in posterioris marginis medio breviter mucronatum, mucronis apice pallide brunneo, anum vix superante. Valvulæ anales laterales pilosæ. Squama analis inferior triangularis postice mucronata. Caput nigrum, antice fuscescens, margine labiali flavicante-albido. Labium inferius fuscescens, margine anteriore flavicante-albido. Corpus totum fusco-nigrum, nitidum, abdomine pallidiore. In dorso medio,

exceptis cingulis anterioribus, fascia longitudinalis subfuscente-flava, linea puncta subfuscente-atra divisa. Pedes albido et fusco-variegati.

Longitudo $3\frac{3}{4}$ ad 4‴; latitudo $\frac{1}{3}$‴.*

I. EXIGUUS, *Brandt*, Recueil, p. 85.

" *Gervais*, Apteres, vol. iv, p. 177; Exp. Amer. du Sud (Castel.), Tabl. Myriap., p. 18.

Species mihi ignota.

I. OREGONENSIS.

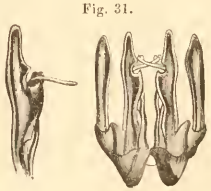
I. læte castaneus, albido-brunneo annulatus, et linea dorsale nigra et maculæ nigræ seriebus lateralibus ornatus; antennis filiformibus, longis, pilosis, subclavatis; capitis margine antico valde emarginato, denticulato; segmentis 44—45; scutorum lateribus canaliculatis; mucrone parvo, robusto; squama preanali triangulare.

Bright chestnut, annulate with whitish brown, and ornamented with both a black dorsal line and a lateral series of black dots; antennæ filiform, long, pilose, subclavate; anterior margin of the head strongly emarginate, denticulate; segments 44—45; sides of the scuta canaliculate; mucro small, robust; preanal scale triangular.

I. OREGONENSIS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 11.

The color of this elegant species is a bright chestnut, ornamented with rings of a very light brown and a dorsal black line, as well as a black spot on the side of each scutum. In some individuals there is on the anterior portion of the first scutum a black crescentic blotch, and on the posterior a border of the same tint. The anterior aspect of the vertex is long and narrow and deeply emarginate inferiorly, where it is denticulate and fringed with two rows of distant hairs. The eyes are somewhat elliptical, and are connected by an illy defined black band. The posterior portion of the body is not pubescent. The outer piece of the male appendages (Fig. 31) is rather long, straight, and somewhat clavate, and distally pilose. The inner process is large, and is formed of a plate so folded longitudinally as to form a groove on the inner edge. From the base of the appendage springs a slender process, which soon bifurcates; the more slender of the divisions is the longer. They both soon enter the groove, before spoken of, the shorter and more robust being distal as to the other, and emerging from the groove on the other side of the main process, whilst the longer comes out on the same side as it enters. The female appendages are composed of a broad, thin piece, from which arise a pair of filiform, feet-like processes, besides two other very robust ones. These last are sparsely pilose, and about as long as broad. They

Fig. 31.



* This is copied from Mr. Brandt's description in Recueil, &c.

reach about to the base of the filiform bodies, and have a slit-like orifice in their summit.

Length of body, 2½ inches.

Hab. Oregon.—Smithsonian Museum.

I. CANADENSIS.

I. brunneo-castaneus, linea nigra dorsali et punctorum nigrorum seriebus lateralibus ornatus; segmentis 53; mucrone maximo, robusto, acuto, uncinato.

Brownish chestnut, ornamented with a black dorsal line and lateral series of black dots; segments 53; mucro very large, robust, acute, uncinate.

I. CANADENSIS, *Newport*, Ann. and Mag. Nat. Hist., vol. xiii, p. 268.
" *Gervais*, Apteres, vol iv, p. 178; Exped. L'Amer. du Sud, Tab. Myr., p. 18.

I have seen specimens of this species and written a detailed description, which was destroyed at the Smithsonian fire. At present I am unable to obtain any specimens, and therefore am forced to give only a specific diagnosis from memory. Length, 2 inches. Fig. 32 is a drawing of the female organs.

Fig. 32.

Hab. Northeastern United States, Canada.

I. IMMACULATUS.

I. saturate rubido-brunneus, haud maculatus; antennis modice longis, filiformibus, vix subclavatis, pilosis; capitis margine antico modice emarginato; segmentis 48—51; scutis infra canaliculatis; mucrone magno, uncinato, robusto, acuto.

Deep reddish brown, not maculate; antennæ rather long, filiform, scarcely subclavate, pilose; anterior margin of the head emarginate; segments 48—51; scuta inferiorly canaliculate; mucro large, uncinate, robust, acute.

I. IMMACULATUS, *Wood*, Proc. A. N. S., 1864, p. 12.

The color of all our specimens is a very dark reddish brown, unrelieved by any other tint. On the vertex is a pair of coarse punctations, as in *I. Canadensis*. The lateral processes of the first scutum in the female, although small, are somewhat canaliculate. The mucro is certainly smaller than that of *I. Canadensis*. The male appendages are composed of two parts. The outer of these consists of a somewhat clavate and pilose process, with a curiously folded and contorted plate on its inner side. The other portion is formed of a straight process, which has several minute, spine-like bodies on its free extremity, and is proximally suddenly contracted, and then expand somewhat, so as to give an appearance of emargination. From the base of this springs another, almost filamentous process.

Fig. 33.

The female (Fig. 33) appendages consist of two bodies conjoined at their bases, and blunt at their free extremity. When viewed from one aspect they appear cylindrical, but, from the other, flattened or even concave; opposite to the latter face there is a broad, irregular piece, which has its free extremity scolloped.

Hab. Catskill Mountains, New York.—Dr. H. C. Wood, Jr.

I. PENNSYLVANICUS.

I. brunneus; antennis filiformibus, modicis, pilosis, vix subclavatis, articulis nigricantibus apicibus albidis; segmentis 63; mucrone recto, nonnihil breve; corpore postremo piloso.

Brown; antennæ filiform, moderate, pilose, scarcely subclavate, their articles blackish with whitish apices; segments 63; mucro straight, rather short; body posteriorly pilose.

I. PENNSYLVANICUS, *Brandt*, Recueil, p. 85.
" *Gervais* (Suit a Buffon), Apteres, vol. iv, p. 179.

The general color of this species is brown, but there is a series of lateral black dots around which the color is often much lighter. There is a pair of punctations on the vertex, which is traversed by a broad blackish band. The inferior portion of the head is light brown, often mottled. The labrum is moderately emarginate. Each scutum is furnished with a series of rather distant puncta, from each of which proceeds a more or less obsolete superficial groove.

Fig. 34.

The male appendages (Fig. 34) are composed on each side of two parts attached to the basal piece. The outer of these is nearly straight, though somewhat rolled on itself, and is distally enlarged and pilose. The inner part is formed chiefly of a thin, straight piece, very much rolled and twisted. Distally it is expanded into a very thin, transverse, diaphanous, alar process, with serrated edges.

Hab. Pennsylvania.

I. CANALICULATUS.

I. brunneus, interdum cæruleo tinctus; antennis filiformibus, pilosis, nonnihil clavatis; segmentis 51; scutis supra et infra arcte canaliculatis, singulo pilorum longorum distantium serie unica instructo; mucrone longo, recto; squamis analibus longe pilosis; squama preanali triangula, acuminata.

Brown, sometimes with a bluish tinge; antennæ filiform, pilose, somewhat clavate; segments 51; scuta both above and below closely canaliculate, each furnished with a single series of long distant hairs; mucro long, straight; anal scales with long hairs; preanal scale triangular, acuminate.

1. CANALICULATUS, *Wood*, Proc. A. N. S., 1863, p. 12.

The color of this species is a dark brown, with sometimes a bluish tint, and very generally mottled with light brown. The triangular eyes are connected by an obscure black band. The labial margin is broadly emarginate, and is furnished with two or three denticules, as well as a double row of distant rigid hairs. The joints of the antennæ are tipped with white. The first scutum is, in the female, slightly prolonged laterally, where it is rounded off; on its anterior surface there is a dark, somewhat crescentic, blotch. The anterior of the two subscuta, forming each scutum, is closely and deeply canaliculate through its whole circumference; it is broader than the posterior, and very slightly elevated, so as to give the body somewhat of a moniliform appearance. The ring of hairs surrounding each scutum is frequently imperfect; it may be from the handling of the specimen. The posterior subscutum is smooth above, and distantly and shallowly canaliculate below. The posterior portion of the body is very pilose. I have never seen a male. Length, 1½ inches.

Hab. Chester County, Pennsylvania.—Dr. H. C. Wood, Jr.

1. LAQUEATUS.

I. brunneus, interdum cæruleo tinctus; antennis filiformibus, pilosis, nonnihil clavatis; segmentis 49; scutis et supra et infra valde arcteque canaliculatis; mucrone longo et recto; squama preanali triangula, vix acuminata.

Brown, sometimes with a bluish tint; antennæ filiform, pilose, somewhat clavate; segments 49; scuta both above and below deeply and closely canaliculate; mucro long and straight; preanal scale triangular, scarcely acuminate.

1. LAQUEATUS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 13.

The color of this species is brown, sometimes bluish, mottled, almost areolated, with light brown. The eyes are triangular, and are united by a dark band. The head has its anterior margin broadly emarginate, denticulate, and furnished with two rows of distant rigid hairs. The antennæ have their proximal joints nearly cylindrical, and are light colored, with their articles indistinctly tipped with white. The first scutum has rather small lateral processes, and is ornamented on its anterior border with a dark band. The anterior subscuta are deeply and closely canaliculate over the whole of their surface. The anal scales are furnished with a series of long hairs along their valvular margin. The posterior portion of the body is generally adorned with a very few scattered hairs, but I have never seen it pilose. Length, ¾ of an inch.

This species differs from *I. canaliculatus* in its smaller size, the absence of hairs on the anterior, and their paucity on the posterior portion of the body, and in the mucro being larger in proportion to the rest of the animal.

Hab. Chester County, Pennsylvania.—Dr. H. C. Wood, Jr.

I. CINEREFRONS.

I. brunneus, cinereo annulatus; capitis superficie antica cinerea; mucrone nullo; squama preanali triangula, haud acuminata.

Deep brown; antennæ filiform, long, pilose, clavate; scuta below deeply and closely canaliculate, above sometimes obsoletely so; segments 33; mucro none.

I. CINEREFRONS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 13.

The color of this species is dark brown. The anterior surface of the head is an obscure gray color, with a dark band. There is between the upper and anterior surface of the head a well-marked angle, almost an elevated ridge. The lower margin is fringed with a few hairs, and is emarginate and armed with a few denticules. The triangular eyes are connected by a distinct, impressed line. On the upper portion of the anterior surface of the head are two round, light dots, surrounded by a darker tint. The antennæ are wanting in the only specimen, a female, that I have seen, which is so mutilated that I cannot say certainly of how many segments it was composed; the number, however, was probably either thirty-four or forty-five. The first scutum has very small, lateral processes. It is light brown, bordered with a dark band, edged with a grayish tint. The anterior portion of the body is of a lighter shade than the posterior, and has the grayish annuli more distinctly pronounced. The anal scutum is not mucronate. The anal scales are not pilose.

Hab. Oregon.—Smithsonian Institution.

I. MILESII.

I. saturate brunneus; antennis filiformibus, longis, pilosis, clavatis; scutis infra arcte et valde, supra interdum obsolete, canaliculatis; segmentis 33; mucrone nullo.

Brown, annulate with ash color; anterior surface of the head cinereous; mucro absent; preanal scale triangular, not acuminate.

I. MILESII, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 13.

The color of this species is a very dark, almost black brown; but the anterior portion of the body, and especially the head, is lighter. The antennæ are very pilose, and quite strongly clavate. The eyes are connected together by a black band. The anterior scuta have their lateral surfaces closely and deeply canaliculate, but are almost smooth on their upper surface. The posterior are everywhere deeply channelled, although more so below than above. There are a few hairs on the anal scales. The anal scutum is not mucronate. It affords me pleasure to dedicate this species to Professor Miles, who is laboring so assiduously and successfully to develop the zoology of Michigan.

Hab. Michigan.—Collection State Agricultural College. Professor Miles.

I. CÆRULEO-CINCTUS.

I. brunneus, saturate cæruleo annulatus; segmentis 42; antennis parvis; scutis infra et supra modice canaliculatis; mucrone nullo.

Brown, annulate with deep blue; segments 42; antennæ small; scuta both below and above moderately canaliculate.

I. CÆRULEO-CINCTUS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 14.

The color of this species is brown, with a dark, sometimes obsolete ring of blue to each segment, except the most anterior. The lower portion of the anterior surface of the head is light brown. The labial margin is scarcely emarginate, but is rounded and fringed with rigid hairs. The eyes are arranged in subtriangular patches, with their transverse diameter much the greater. They are connected by a black band, which is much broader in the middle than at the ends. The first scutum is large, with very small lateral processes even in the female. There is on its anterior edge a very obscure light border, and a little posterior to this a black, more or less obsolete, band. The scuta are regularly, although rather lightly and distantly canaliculate over their whole surface. The last scutum is distinctly but minutely punctate, has its edge whitish, and is not at all mucronate. The anal scales are not at all pilose. The specimens from which this description is taken are in so bad a condition that I have hesitated to notice them. But probably the description will be found to be sufficiently accurate for the identification of the species. Length of body about 1½ inches.

I. HORTENSIS.

I. brunneus, lateribus maculis nigris ornatis; antennis modice brevibus, pilosis, filiformibus, clavatis; segmentis 42; scutis arcte canaliculatis et infra et supra; mucrone nullo; squama preanali triangula, apice rotundato.

Brown, ornamented with black spots on the sides; antennæ rather short, pilose, filiform, clavate; segments 42; scuta closely canaliculate both above and below; mucro absent; preanal scale triangular, with its apex rounded.

I. HORTENSIS, *Wood*, Proc. A. N. S., 1864, p. 14.

The general color of this species is rather dark brown in the adult. When an individual is examined with a magnifier, it is seen to be beautifully areolated with light brown. In young specimens and adults, which have recently shed their exuviæ, the color often verges on white, whilst the side spots are black, contrasting strongly with the general tint. The head is rather broad inferiorly, and has its lower margin shallowly emarginate, and distinctly, though minutely, denticulate. The triangular eyes are connected by a broad, dark band. The first scutum is ornamented on its anterior portion by a dark, transverse band. The lateral processes are almost wanting, even in the female. There is on each side a series of large, black dots, one to a scutum, commencing rather abruptly at about the fifth or sixth segment, and ending in the same way at about the thirty-ninth. The subscuta on which they are situated are scarcely canaliculate. The anal scutum is about equal in length to the two preceding it. Length, ½ to 1 inch.

Hab. Philadelphia.—Dr. H. C. Wood, Jr.

I. VIRGATUS.

I. saturate brunneus; dorso luteolo, medio linea nigra instructo; antennis modice longis, pilosis, clavatis; segmentis 35; scutis copiose distincte canaliculatis; mucrone subnullo; squamis analibus sparse pilosis; squama preanali lata, subtriangula, apice rotundato.

Deep brown; dorsum yellowish, furnished with a median black line; antennæ moderately long, pilose, clavate; segments 35; scuta copiously distinctly canaliculate; mucro almost wanting; anal scales sparsely pilose; preanal scale broad, subtriangular, with rounded apex.

I. VIRGATUS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 14.

The sides of the body are deep brown, almost black, whilst the dorsum approaches a yellowish fawn color, and has a strongly pronounced, black median line. The lower margin of the head is broadly emarginate, denticulate, and fringed with a series of hairs. The anterior surface is mottled with light brown, and has a dark median band, terminating in a transverse one low down. The under surface of the body is light-colored, and is often somewhat areolated. There are some specimens whose pattern of coloration is light brown or fawn colored, with two lateral and one median dark stripe. Are these

individuals which have recently cast off their exuviæ? The eye-patches are somewhat parabolic. The joints of the antennæ are obconical, dark colored, and tipped with white. The lateral processes are small. The grooving of the scuta is in some specimens somewhat obsolete on the dorsum. The posterior scutum is light colored. I have never identified a male. Length, $\frac{1}{2}$ to $\frac{3}{4}$ of an inch.

Hab. Philadelphia.—Dr. Joseph Leidy, Dr. H. C. Wood, Jr. Washington, D. C.—F. W. Putnam.—Collection Museum Comp. Zoology.

I. STIGMATOSUS.

"Body brownish, with an impressed dorsal line, impressed white dots and spots; ultimate segments unarmed.

"Body cylindrical, emarginate, above dark brown, glabrous, an obsolete, dorsal, whitish, slightly impressed, acute line; segments each with a white dot on either side above, and a larger transversely oblong lateral one, which is gradually more completely bisected on the posterior segments into two distinct dots, which on the terminal segments resemble the dorsal ones; ultimate one abruptly narrower than the preceding and truncated; anterior segments attenuated to the head, which is wider than the anterior one; anterior segment as long as the second and third ones conjointly; spiracles somewhat prominent; eyes very distinctly granulated, subtriangular, black; head dark brown; labrum white."

IULUS PUNCTATUS, *Say*, Journ. A. N. S., new series, vol. ii, p. 102.

I. STIGMATOSUS, *Brandt*, Recueil, p. 88.

" *Gervais*, Apteres, vol. iv, p. 179; Exp. L'Amer. du Sud, Tabl. Myriap., p. 18.

Species mihi ignota.

I. MINUTUS.

"Body with a lateral series of black dots, terminal segments unarmed."

"Body cylindrical, emarginate, above pale, obsoletely reticulate, and varied with reddish; a lateral series of large black spots, numerous longitudinal impressed acute lines beneath the stigmata becoming gradually shorter to the origin of the feet, beneath whitish; head white beneath the antennæ; antennæ two joints preceding the last, somewhat dilated, not attenuated at their bases, nor separated by a contraction; eyes black, longitudinally sublunate; ultimate segments unarmed longer than the penultimate one, rounded at tip and blackish. Length nearly half an inch. Common on the Eastern Shore of Virginia."

I. PUSILLUS, *Say*, Journ. A. N. S., new series, vol. ii, p. 105.

I. MINUTUS, *Brandt*, Recueil, p. 89.

" *Gervais*, Apteres, vol. iv, p. 178; Exp. L'Amer. du Sud, Tabl. Myriap., p. 18.

I. SAYII, *Newport*, Ann. and Mag. Nat. Hist., vol. xiii, p. 268.

Species mihi ignota.

Genus SPIROBOLUS.

Scuti primi latera brevia, haud producta. Scuti secundi latera longe producta, cum superficiebus anticis triangulis.

Sides of the first scutum short, not produced. Sides of the second scuta very much produced, with anterior triangular surfaces.

Spirobolus, *Brandt*, Recueil, p. 114.

The form and general appearance of this genus is very different from that of the true Iulus. The great size and thickness of the body, and the peculiar way in which the head is set into it, so to speak, attract the first glance of the observer. The head is generally not proportionally very large. The antennæ in our American species (except angusticeps?) are very short, and often lie almost hidden in a groove in the side of the head, bent so as to form a right-angled "knee," with their free end directed downwards.

The eye-patches are of various shapes, and, though large, are generally not very prominent. The first scutum is broad, antero-posteriorly, with its sides more or less obliquely truncate. The second scutum has its sides much produced and bent forwards, so as in a measure to embrace the first scutum. Where it abuts against the head there is on each side a triangular surface.

In all the species which I have examined, the male appendages are formed after one very peculiar type, with marked specific differences in the minutiæ of their forms. This may prove to be generic. In the true Iulus no appendages have as yet been described agreeing with this pattern.

S. marginatus.

S. saturate brunneus, rubeo annulatus; capite copiose minute punctato, antico punctorum maximorum serie instructo; segmentis 53—57; scutis copiose minute punctatis; squama anale triangula.

Deep brown, annulate with red; head copiously minutely punctate, furnished anteriorly with a series of large puncta; segments 53—57; scuta copiously minutely punctate; anal scale triangular.

Iulus marginatus, *Say*, Journ. Acad. Nat. Sci., 1st series, vol. ii, p. 105.
" " *Gervais*, Apteres, vol. iv, p. 180; Exped. L'Amer. du Sud (Castelnau), Myriap., p. 19.
" " *Brandt*, Recueil, p. 89.

S. marginatus, *Newport.*

? Iulus Americanus, *Pal. Beauvois*, Insect. Afriq. et Amer., p. 155.
? Iulus incertus, *Brandt*, Recueil, p. 121.
Iulus ornatus, *Girard.*
? Iulus atratus *Girard*, Marcy's Report, Expl. Red River of the South, p. 274.

The color of this species is a very dark brown, sometimes with a reddish, sometimes with an olive or even bluish tint. The head is quite deeply emarginate. The vertex furrow is pronounced. The first scutum is margined with deep red both anteriorly and posteriorly. The posterior borders of the other scuta are furnished with a narrow, dark brownish, red margination.

The male appendages (Fig. 35) are formed of two outer parts and the yoke-like piece which connects them. The former are composed of the following parts: First. A thin plate bent around the inner portion; this is deeply notched laterally, but presents on one aspect a long, low, smooth surface; on the other it is produced into a broad process, rapidly narrowing and terminating distally in a very narrow, blunt portion, which is abruptly bent on itself, but does not form a hook. Next within this is a large, thick, blunt, curved process, composed of a plate so bent on itself as to make a sort of sheath, in which lies a thin, flat, blunt, slightly falciform process.

Fig. 35.

Hab. United States.

M. Girard has described two species of Iulus from the Southwest, atratus and ornatus. His description of the latter applies to I. marginatus. I have seen the type of I. atratus, but unfortunately in such a bad state of preservation that I am unable to decide with certainty its claims to rank as a species; it is, probably, however, nothing more than a variety. The descriptions of M. Girard are given below in full.

I. ORNATUS.

"*Spec. Char.*—Ground-color bluish black; segments narrowly margined posteriorly with reddish; anterior margin of segments rather blue, whilst the middle is rather black, thus giving the appearance of three rings of color. The anterior portion, which is covered by the articulation, is fulvous. Feet deep chestnut-brown. Antennæ rufous at base, blackish at tip. Stigmata not conspicuous, marked by a series of small obsolete blackish spots."

"*Remarks.*—This species is allied to Iulus marginatus of Say, but the body is proportionally much stouter. The ocelli are disposed upon a subtriangular space quite different in shape. The antennæ themselves are slenderer in proportions. The labrum (upper lip) is also less emarginated than in Iulus marginatus, and the marginal punctures much less conspicuous."

I. ORNATUS, *Girard*, Marcy's Report, Exploration Red River of the South, p. 274.

I. ATRATUS.

"*Spec. Char.*—Body, feet, and antennæ, uniform deep blackish brown; antennæ and feet

occasionally reddish, as also the labrum and anterior margin of first segment. Posterior third of each segment of a shining black. Stigmata and lateral striæ beneath quite conspicuous."

"*Remarks.*—Resembles more *Iulus ornatus* than *I. marginatus* in the general proportions of the body, but in the structure of the antennæ and labrum comes nearer to *I. marginatus*."

I. ATRATUS, *Girard*, Marcy's Report, p. 274.

S. UNCIGERUS.

S. læte brunneus, saturate-rubeo-brunneo annulatus; capite sparse minute punctato et corrugato, antico punctorum maximorum serie instructo; segmentis 50—53; scutis supra et copiose punctatis et corrugatis; squama anale triangula.

Bright brown, annulated with deep reddish brown; head sparsely minutely punctate and corrugate, anteriorly furnished with a series of large puncta; segments 50—53; scuta above both copiously punctate and corrugate; anal scale triangular.

S. UNCIGERUS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 15.

The color of this species is a bright brown, with an annulus of dark reddish brown on the posterior border of each segment. The head is distinctly medianly canaliculate, except in the centre, and has the row of dots on its anterior face, as in *S. marginatus*, but is not as decidedly punctate elsewhere as in that species. The eyes are triangular. The antennæ closely resemble those of *S. marginatus*, but are, perhaps, rather shorter and more compressed. The first scutum is banded, both anteriorly and posteriorly. The lateral processes, even the female, are almost wanting. The second scutum is produced forwards as in *S. marginatus*. The male appendages (Fig. 36) are composed of a yoke-like piece and two outer parts, which it connects. The central piece may be described as formed by two plates (although but really one) meeting at an angle in the centre and attached to the outer parts at their other extremities. These outer articles are formed each as follows: First. There is a large plate which is bent around an inner basal piece, and is deeply notched laterally, but is produced anteriorly into a broad, almost rudely punctate plate, and posteriorly into a short, slender process, terminating in an imperfect hook. This last process is sometimes obsolete. Second. Articulating with the

Fig. 36.

inner basal piece, alluded to, there exists a large, strongly-curved, acute hook or claw, whose distal extremity is subcylindrical. The female appendages are small, and are composed on each side of a very thin plate and a process about a line in length, proximally irregularly prismatic in shape; but distally excavated suddenly, so as to be flattened for the remainder of its course.

Hab. California.—Smithsonian Institution.

S. ANGUSTICEPS.

S. niger, lateribus brunneo maculatis; capitis superficie antica angusta, longa, supra nigra, infra albido-brunnea; antennis ?; segmentis 75; scutis et infra et supra distincte canaliculatis; squama anali triangula.

Black, with the sides maculate with brown; anterior surface of the head narrow, long, above black, below whitish brown; antennæ ?; segments 75; scuta both above and below distinctly canaliculate; anal scale triangular.

S. ANGUSTICEPS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 16.

The color of this species is black, with a brown band on the sides, in which is a black dot marking the position of the lateral pores. The lower portion of the head is very light-brown, and is rather deeply emarginate. Along the posterior cephalic border is a somewhat crescentic area, which is nearly smooth and is medianly canaliculate; adjoining this the surface suddenly is rudely punctate, but gradually becomes smoother. The eyes are arranged in three transverse rows, the posterior being much the longer. The first scutum is copiously coarsely punctate, and is posteriorly slightly canaliculate on the dorsum, but distinctly so on the sides. The lateral processes, even in the female, are obsolete, the second scutum being produced forwards so as to abut on the head. The posterior subscuta are on the dorsum closely, rather deeply, and more or less obliquely canaliculate, but on the sides less distinctly and more distantly so. The anterior subscuta are very distantly and much more lightly and obliquely canaliculate, and are also more closely channelled below than above. The surface of the anal scutum is irregularly and minutely corrugate. I have seen but one imperfect specimen—a female. The female (Fig. 37) appendages appear to consist of two conoidal bodies coalescing at their bases and united together towards their apices by a broad plate, so placed as to present towards them an inclined surface. Into the base of these pyramidal processes fit other somewhat prismatic bodies (Fig. 37 *a*), with their thin edge formed of several pieces. Length, 4½ inches.

Fig. 37.

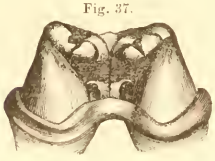


Fig. 37 *a*.

Hab. San Francisco.—Smithsonian Institution.—R. D. Cutts.

S. SPINIGERUS.

S. fulvus, maculis saturate viridis maximis ornatus; capite minute punctato, infra punctorum magnorum serie instructo; oculis suborbiculatis; antennis longis; segmentis 48; scutis leviter sparse punctatis; squama preanali triangula.

Fulvous, ornamented with very large deep-green maculæ; head minutely punctate, furnished inferiorly with a series of large puncta; eyes suborbicular; antennæ long; segments 48; scuta sparsely lightly punctate; preanal scale triangular.

S. SPINIGERUS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 15.

The color of this species is fulvous, often varying towards orange. On each scutum there is a large dark-green transverse crescentic blotch. This is often so wide superiorly as to involve the whole of the dorsum. In some individuals there are lateral series of white blotches, and occasionally a black line on each side. These are, however, not common. The head has a strongly pronounced median furrow, and is greenish superiorly. The eye-spots are somewhat orbicular, with occasionally a tendency to become tetragonal or polygonal. The antennæ are longer than in *S. marginatus*. The scuta are not rough, and are very lightly or even obsoletely furrowed beneath. The spines on the inferior surface of the legs are very numerous and acute. The male (Fig. 38) appendages are formed of two main portions joined together, as in *S. marginatus*. The large plate of the main process is broad. The upper border of its face has a wavy outline. Externally it is produced into an alar portion, which ends in a blunt process at right angles to it. The inner piece is composed of a basilar and superior joint. The basilar is very long. The other (Fig. 39) is curved, and presents on one aspect a strongly convex, on the other a strongly concave surface. It ends in a blunt point, and is armed with a large blunt process and an acute spine. The female appendages appear to consist on each side of a process deeply placed within the body,—this is thin on its free margin, which is rounded, though somewhat acuminate; below it is contracted and thickened. The three pairs of feet immediately in front of the genital aperture in the male have their coxæ produced into long processes. These are often of a curious form, but do not seem constant in this. The fourth and even fifth coxæ have small processes.

Fig. 38.

Fig. 39.

Hab. Florida. South Carolina.—Smithsonian Institution.

S. ANNULATUS.

"Body with numerous, elevated, obtuse lines, of which four are above the stigmata; ultimate segment glabrous, unarmed."

"Body cylindrical, emarginate, above brownish with a slight tint of red, immaculate, beneath yellowish white; segments each with about fifteen elevated obtuse lines, of which four are equal dorsal, a pyriform larger oblique one on the stigmata, and about ten decreasing in size to the feet, anterior segment as long as the three succeeding ones conjunctly and glabrous, posterior one glabrous reddish brown, as long as the two preceding ones, united and obtusely rounded at tip; head whitish before; antennæ white; eyes transverse linear, black; vertex not distinctly impressed."

I. ANNULATUS, *Say*, Journ. A. N. S., 1st series, vol. ii, p. 103.
S. ANNULATUS, *Newport*.

Species mihi ignota.

FAM. POLYDESMIDÆ.

Sterna et scuta arcte conjuncta; scuta laminis lateralibus instructa.

Sterna and scuta closely cemented together; scuta furnished with lateral lamina. (Fig. 40.)

The head in the Polydesmidæ is large and massive. The absence of eyes and the small antennæ point to a state of low development of the special senses. The female genitalia are placed in the third segment, just posterior to the second pair of legs. They are generally more or less hidden within the body. The male organs are situated in the seventh segment, replacing the eighth pair of legs. They generally project from the body so as to be very prominent.

Fig. 40.

Authors generally have divided this family into genera, founded upon the size and form of the lateral lamina. But, as H. De Saussure (*loc. cit.*) has remarked, these characters are relative, and the differences so merge into one another that the groups cannot be well defined or separated by distinct border lines. He therefore has very properly adopted these groups as subgenera. Fontaria, he thinks, has more claims as a distinct genus than the others, but even this is scarcely worthy of the higher rank. He takes for his generic characters the position and numbers of the lateral pores. In this I have followed without feeling sure but that at some future time still better characters will be elucidated. Two forms herein described apparently do not belong in the

genus Polydesmus, as defined by H. De Saussure; but, not being entirely certain that my specimens are adults, I have refrained from indicating a new genus.

When surface markings exist on the scuta, they are very useful in defining species. The color is also a good character in some groups. Where one of these fails us the other very generally assists. The form of the last scutum is sometimes distinctive. The best characters, however, are those derived from the genital organs. The form, &c., of the antennæ and head often afford some clue.

Genus POLYDESMUS, *Latreille.**

Meatus laterales in scutis 5—7—9—10—12—13—15—16—17—18—19—positus.

Lateral pores situated upon the 5—7—9—10—12—13—15—16—17—18—19—scuta.

Polydesmus, *H. De Saussure*, Mem. Soc. Nat. Hist., Geneva, vol. xv, p. 292.

Subgenus POLYDESMUS.

Dorsum complanatum. Laminæ laterales magnæ, horizonti ad libellam respondentes.

Dorsum complanate. Lateral lamina large, horizontal.

P. setiger, sp. nov.

P. brunneus; scutis squamis obtusis parvissimis (interdum obsoletis) ornatis; laminis lateralibus marginibus acute valdissime serratis.

Brown; scuta ornamented with very small, obtuse (sometimes obsolete) scales; lateral lamina with their margins acutely and very strongly serrate.

The head is broad, and has its anterior surface pubescent. The antennæ are rather long, filiform, pubescent, and strongly clavate. The first scutum is transversely oval. It is narrower than the head. The surface of the scuta is covered with minute flattened tubercles. On the more anterior these are quite distinct and arranged somewhat regularly in a fourfold series. On the more posterior they become less and less distinct, so that in some individuals these scuta have scarcely more than a rough appearance. Many of these tubercles are seta-tipped, and on the posterior borders of the scuta they become conical and acute, each with its rigid hair forming a sort of fringe. The lateral laminæ are broad and not widely separated. The serrations are less strongly pronounced on the

* As Latreille was the original describer of the genus Polydesmus, of course his name must be connected with it. But the genus, as here adopted, was first defined by H. De Saussure.

posterior than the anterior. The last scutum is triangular with its apex prolonged and decurvate.

The specimens which I have examined have only eighteen segments each, exclusive of the head, and of these there are lateral pores on only the 5—7—9—10—12—13—15—16—17—as in the following species. The more obvious specific differences between this species and P. granulatus, Say, are the following: The side plates are broader and closer together, and much more deeply serrate on their margins. Whilst in P. granulatus the squama on the scuta are more pronounced, less conical and acuminate, and never seta-tipped.

Hab. Pennsylvania.—Dr. H. C Wood, Jr.

P. GRANULATUS.

P. brunneus; scutis squamis obtusis convexis in serie quadruplici dispositis ornatis.

Brown, scuta ornamented with a fourfold series of obtuse, convex scales.

P. GRANULATUS, *Say*, Journ. Acad. Nat. Sci., 1st series, vol. ii, p. 107.
" *Gervais*, Suit. a Buffon, Apteres, vol. iv, p. 104.

The head has its anterior surface covered with numerous short rigid hairs, causing it to appear pubescent. The antennæ are rather long, pubescent, and clavate. The first scutum is transversely oval, narrower than the head. The lateral lamina are not very large, and are separated from one another by broad intervening spaces. The anterior are deeply and acutely serrate; the others slightly serrulate. The oval surfaces of the scuta are covered with convex, obtuse tuberculoid scales, arranged in four more or less regular transverse rows. The last scutum is triangular, with its apex somewhat prolonged and decurvate; it is shortly pilose. I dissected the sexual organs of the only male which has come under my notice, but unfortunately the detailed description was lost at the Smithsonian fire. If my memory serves me right, the proximal portion of the spine is robust and very nearly straight; its distal extremity (Fig. 41) is swollen into a sort of knob-like process, from which arise two slender curved processes, one of which is slightly bifid, whilst the other is remarkable for being articulated by means of a movable joint.

Fig. 41.

All of the specimens examined have only nineteen segments, exclusive of the head, and of these the eighteenth and nineteenth are without lateral pores. This would remove the species from the genus Polydesmus (as here defined) were it certain that the specimens are adults. They have been collected at different localities, but still may not be fully developed, although they have the appearance of being so. Mr. Say's description will apply

very readily to the preceding species, but it seems to me to fit this one rather more closely, and as the choice must be somewhat arbitrarily made in the absence of proof as to which he intended, I think the name should be allowed to rest here. Length, ½ inch.

Hab. Pennsylvania.—H. C. Wood, Jr., M.D. Michigan.—Prof. Miles. Canada.—Prof. Dawson.

P. SERRATUS.

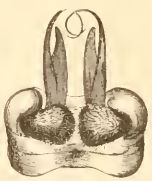
P. saturate brunneus; antennis pubescentibus, clavatis; scutis, singulo squamarum seriebus duabus et altera obsoleta ornato, marginibus lateralibus serratis; appendicibus masculis pilosis, spina terminale duplica. (Fig. 42.)

Deep brown; antennæ pubescent, clavate; scuta each with two rows of squama and a third obsolete series, their lateral margins serrate; male appendages pilose, their terminal spine double.

P. SERRATUS, *Say*, Journ. Acad. Nat. Sci., 1st series, vol. ii, p. 106.
" *Gervais*, Suit. a Buffon, Apteres, vol. iv, p. 105; Exped. L'Amer. du Sud (Castelneau), Myriap., p. 6.
" *Newport*, Cat. Brit. Mus. ?

The pilose anterior aspect of the head is quite broad and triangular, with the vertex furrows strongly pronounced. The first scutum is transversely oval, with three rows of elevated, obtuse, minute scales. On most of the other scuta there are two series of similar larger scales, with an obsolete series of very broad ones in front of them. The posterior row is generally composed of six, the next of four. The lateral lamina are large, and have their margins much more serrulate than in P. Canadensis. The last scutum is triangular and decurvate. The prominent knob-like portion of the male appendages is very hairy. The terminal spine is double, one portion being much more robust than the other, blunt and nearly straight. The longer piece is distally very slender and bent over the other.

Fig. 42



Length ¾ of an inch.

It will be seen, on comparison of my description with the original one of Mr. Say, that it differs somewhat. The fact of Say's not mentioning the existence of the obsolete series of scales on the anterior surface of the scuta, has been the cause of M. Saussure's error. After carefully going over the whole ground, there is but little doubt in my mind that this is the species meant to be indicated by Say. If not, it is an undescribed species, and the real P. serratus has not yet come to light. It is an unfortunate fact that the earlier descriptions of Myriapoda are by no means exact, the authorities not appearing to have had any definite idea as to what constituted *specific* characters. If we interpret their records too closely, we may be led to false deductions.

Hab. Pennsylvania, &c.

"*Stenonia hispida.* Body composed of seventeen double segments, distinctly divided on the dorsal mesial line. Body depressed, margins of segments quite prominent and curved forwards near the head, in the middle and posteriorly transverse or curved slightly backwards. Surface of each segment covered with five rows of distinct tubercles, arranged somewhat in quincuncial order. From the direction of the tubercles the lateral and posterior margins of each segment appear serrated. First cervical segment smaller than the next, rounded anteriorly, straight and narrower behind, and obliquely truncated on the sides. The posterior segment about equal to the next in length, is triangular, the apex armed with a stiff hair. Color pale red above, feet and ventral surface flesh colored.

Length 6″. Under decayed logs."

Sager, Proc. Acad. Nat. Sci., 1856, vol. viii, p. 109.

I have never seen a specimen corresponding entirely with this description. Is it possible that Mr. Sager's species is either *P. serratus*, Say, or *P. setiger*, Wood?

P. CANADENSIS.

P. saturate brunneus; antennis pubescentibus, vix clavatis; scutis, singulo squamis 8 in serie duplici dispositis ornato, marginibus lateralibus obsolete serratis; appendicibus masculis (Fig. 43) pilosis, spina terminale modica, curvata.

Deep brown; antennæ pubescent, scarcely clavate; scuta each ornamented with 8 squama, arranged in a twofold series; lateral margins obsoletely serrate; male appendages hairy, their terminal spine moderate, curved.

P. CANADENSIS, *Newport*, Ann. and Mag. Nat. Hist., vol. xiii, p. 265; Catal. Brit. Mus., Myriap.
" *Gervais*, Suit. a Buffon, Apteres, vol. iv, p. 106; Exp. L'Amer. du Sud (Castelneau), Myriap., p. 6.
"P. SERRATUS, *Say*," *H. De Saussure*, Mem. Soc. Nat. Hist. Geneva, vol. xv, p. 325.

The color of this species is a dark brown, verging somewhat towards a chestnut, with, in some individuals, still more of the red. The median furrow of the vertex is strongly pronounced. In other respects the head agrees with that of P. cerasinus. The antennæ are rather more pubescent than in that species. The scuta are ornamented with a double row of scales on their posterior surface. These rows are composed each of four broad rectangular scales. There is frequently on each side a raised convexity or umbo lying outside of these. The serratures in the lateral margins of the side plates are very minute and frequently entirely obsolete. The last scutum is triangular, with its obtuse apex decurvate. The male

Fig. 43.

Fig. 44.

appendages (Fig. 43) are moderate. They have a small falciform spinule placed close to their side. The terminal spine springs from a knob-like portion, which is quite hairy and regularly curved. Its margin is irregularly notched near its middle, and its distal portion is curiously fringed. The female appendages (Fig. 44) consist of a pair of bodies shaped somewhat like the crest of a helmet. Along their free margin is an opening surmounted by a double series of teeth-like processes. I think a careful examination will convince any one that M. Saussure (*loc. cit.*) has described this species, under the name of P. serratus, thinking it was the one indicated by Mr. Say.

Length 1½ inches.

Hab. Pennsylvania, New Jersey, Illinois, &c.

P. CERASINUS.

P. dilute cerasinus; dorso complanato; antennis modice pubescentibus, nonnihil clavatis, nonnihil brevibus; scutis squamis obsoletis ornatis, marginibus lateralibus serratis; appendicibus masculis spina terminale lata, oblique truncata, utrinque processu longo setaceo curvato instructa. (Fig. 45.)

Light-cherry red; dorsum complanate; antennæ moderately pubescent, somewhat clavate, rather short; scuta ornamented with obsolete squamæ, their lateral margins serrate; terminal spine of the male appendages broad, obliquely truncate, furnished on each side with a long, curved, setaceous process.

P. CERASINUS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 8.

The head has the median furrow on its vertex illy pronounced. The anterior face is sparsely pilose, and has its lower margin broadly but shallowly emarginate. The scuta have a double row of scales, obsolete, but otherwise similar to those of the following species; sometimes these are entirely lost. The lateral margins of the side plates are rounded slightly and minutely serrulate. They seldom have more than three serratures on each side. The terminal scutum is triangular, with its obtuse apex bent downwards. It is sparsely pilose. The legs are quite hairy and light-colored. Their second joint is tumid. The appendages (Fig. 45) in the male are peculiar. The terminal spines are broad and short, and superiorly very obliquely truncated, with two small hamular processes. On each side a long, seta-like process springs from the base. The outer, much the longer of the two, throws an arch entirely over the short spines. The inner is straighter. They both have one or two thorn-like excrescences.

Fig. 45.

Hab. Oregon.—Museum of Smithsonian Institution.

SUBGENUS PARADESMUS.

Dorsum modice convexum. Laminæ laterales magnæ,—horizonti ad libellam respondentes.

Dorsum convex. Lateral laminæ large, horizontal.

P. ERYTHROPYGUS.

P. olivaceo-castaneus; scutis postice aurantiaco maculatis; laminis lateralibus aurantiacis; scuto anale vix triangulare; appendicibus masculis modice robustis, spina terminale gradatim curvata, spinulo breve lato acuto armata, ultima bifida. (Fig. 46.)

Olive-chestnut; scuta posteriorly maculate with orange; lateral laminæ orange; anal scutum scarcely triangular; male appendages moderately robust; their terminal spine gradually curved, distally bifid, armed with a short, broad, acute spine.

P. ERYTHROPYGUS, *Brandt*, Recueil, p. 134.
" *Gervais*, Suit. a Buffon, Apteres, vol. iv, p. 106; Exped. L'Amer. du Sud (Castelneau), Myriapoda, p. 6.
" *Saussure*, Mem. Soc. Nat. Hist. Geneva, vol. xv, p. 296.

P. CAROLINENSIS, *Saussure*, Mem. Soc. Nat. Hist. Geneva, vol. xv, p. 295.
" *Gervais*, Exped. L'Amer. du Sud (Castelneau), Myriap., p. 14.

The general color of this elegant species is an olive-chestnut; in some individuals the olive overpowering the other tint, and approaching sometimes to a slate color; in others the chestnut predominating. The color is not uniform, it shading darker and darker towards the maculæ. The latter are somewhat semicircular, bright orange, and placed on the posterior margin of the scuta. In most specimens there is a well-marked, black dorsal line. The vertex furrow is strongly pronounced. The anterior surface of the head has a pair of almost obsolete punctiform impressions, and is scarcely emarginate. The antennæ are coarsely pubescent, and not clavate. The first scutum frequently has an orange spot on its anterior margin. The last scutum has its posterior portion very broad, thin, and of an orange hue. The lateral laminæ are larger than in P. hispidipes; and their edges, though thickened, are not so much so as in that species. They are bright both on their upper and under surfaces. The feet are somewhat hairy, and, with the under surface of the body, of a dull-yellow color. The terminal spine of the male appendages has something of the swan-neck curve; on one of its surfaces there is a thorn-like spinule; distally it is shortly bifid. The female appendages (Fig. 47) are composed of a

Fig. 46.

Fig. 47.

basal portion supporting a reniform piece. This is hairy, especially along its free margin, where there is a linear opening.

I think there is not much doubt of the correctness of the surmise of H. De Saussure, that his Carolinensis is merely Brandt's erythropygus with the color altered by drying, &c.; but, that no mistake may be made, I append the description of Saussure.

Hab. Western Pennsylvania.—R. J. Walker, Esq. Illinois.—R. Kennicott, Esq. Smithsonian Collection.

P. Carolinensis.

"Depressus, politus, fuscus (albidus); dorsi medii maculis et carinis carneis; carinæ subcontinuæ, truncaturâ quadrangulâ, marginatæ; anguli antici dente minuto; pori laterales.

Saussure, Linnæa Entomologica, xiii, 1859, p. 325.

♀. Forme grêle, allongée. Carènes peu longuement séparées dans l'état de contraction. Corps lisse, luisant. Antennes assez longues, pouvant atteindre (ou presque) le bord postérieur du troisième segment. Chaperon ayant son bord inférieur cilié, subéchancré. Au dessus de ce bord est un sillon angulaire, qu'on prendrait volontiers pour l'échancrure du chaperon, ou seulement un espace rugueux; et sur les angles latéro supérieurs on voit une bosselure oblique en forme de bourrelet, placée en dehors de l'insertion de chaque antenne. Front partagé par un sillon simple. Corps déprimé, moins haut que large (même sans les carènes). Dos médiocrement convexe (transversalement). Surface dorsale des anneaux, luisante, finement plissée, mais les carènes assez fortement burinées, surtout dans la portion antérieure du corps. La ligne de séparation de la portion cylindrique de chaque segment et de sa portion carénifère offrant une zone de petites stries longitudinales visibles à la loupe. Premier segment un peu moins large que le deuxième; ses lobes latéraux larges et arrondis. Segments suivants ayant tous leurs carènes tronquées à angle droit, bordées antérieurement par un petit cordon et latéralement par un bourrelet saillant qui en occupe toute la longueur. Bord antérieur des carènes faiblement arqué et se terminant par une trés-petite dent, placée en avant du bourrelet latéral. Bord postérieur des anneaux légèrement concave, surtout dans la partie postérieure du corps, où l'angle postérieure des carènes est prolongé en arrière. Segment préanal en palmette subquadrangulaire, tronqué postérieurement. Plaque sous-anale arondie. Valves anales lisses, offrant pres du bord un sillon prononcé. Pores répugnatoires tout à fait latéraux et trés-petits.

Couleur de l'animal dessèche, d'un gris-blanc de porcelaine, ou cendrée, avec une tache couleur de chair au milieu du bord postérieur de chaque segment. Carènes surtout leurs angles postérieurs et le bout du dernier segment, ainsi que le bord antérieur du premier, couleur de chair. Dessous du corps, pattes, antennes et front, fauves ou de couleur pâle. Vivant, l'animal a sans doute une couleur brune. Longueur $0^{m},030$; largeur 0,0045.

♂. Plus aplati que la femelle; le premier segment aussi large que le deuxième; les carènes plus relevées, horizontales; leur triangle postérieur plat et lamelleux.

Habite. La Caroline du Sud."

P. HISPIDIPES.

P. olivaceo-brunneus, immaculatus; scuto anale triangulare piloso, apice truncato et decurvato; pedibus hispidis; appendicibus masculis brevibus, robustis, spina terminale modica, ultima abrupte curvata, dense pilosa. (Fig. 48.)

Olive-brown, immaculate; anal scutum triangular, with long hairs; apex truncate and decurvate; feet roughly hairy; male appendages short, robust; their terminal spine moderate, distally abruptly curvate, densely pilose.

P. HISPIDIPES, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 7.

Fig. 48.

The side plates are rather short, with their edges much thickened. The head has its vertex strongly canaliculate. Its anterior face is marked with two small punctiform impressions. The lower border is not very strongly emarginate, and is set with a fringe of short thick hairs. The antennæ are mostly dark-colored, scarcely at all clavate, and coarsely pubescent. The feet are rough, with closely set, stiff hairs. The anal scutum is prolonged posteriorly, so as to come almost to a blunt point. The appendages in the male are short and thick. Their terminal spine is slightly curved at its base, thence is nearly straight, save at its distal extremity, where it is abruptly curved, becoming nearly horizontal. It is beset with very numerous long hairs. I have examined them in eighteen specimens, and found them to agree perfectly. The female appendages consist of a pair of short, conoidal, very pilose processes, which have an opening along their inner edge. Length, 1⅛ inches.

Hab. Illinois.—Smithsonian Collection. R. Kennicott.

Var. ? P. læte castaneus, fulvo vel rubro maculatus, linea nigra dorsali ornatus; laminis lateralibus marginibus rubris vel fulvis.

Var. ? Bright chestnut, maculate with red or yellow, ornamented with a black dorsal line; margins of the lateral laminæ red or yellowish.

Wood, Proc. Acad. Nat. Sci., 1864, p. 8.

This is possibly a distinct species, but as I have seen but a very few individuals, and the male genital appendages do not differ from those of *P. hispidipes*, I prefer not risking a synonym. Whether the spots are yellowish or red in the living animal, the length of time the specimens have been preserved in alcohol precludes me from deciding.

The spots are sometimes arranged regularly—two large ones on each side of the mesial line, and a row of small ones on the posterior border.

Hab. Illinois.—Smithsonian Collection. R. Kennicott.

Subgenus FONTARIA.

Dorsum convexum. Laminæ laterales magnæ, depressæ.

Dorsum convex. Lateral laminæ large, depressed.

P. Virginiensis.

P. castaneus; laminis lateralibus fulvis; appendicibus maseulis maximis, spinulo gracile basale armato; spina terminale breve, robusta, eurvata, bifida. (Fig. 49.)

Chestnut, with yellowish lateral laminæ; male appendages large, armed with a slender basal spinule, their terminal spine short, robust, curved, bifid.

Iulus Virginiensis, *Drury*, Ins. Exotica.

Polyd. Virginiensis, *Pol. Beauvois.* Ins. á Afr. et Amer. Apteres, pl. iv, fig. 5.

" " *Say*, Journ. Acad. Nat. Sci., 1st series, vol. ii.

" " *Gervais*, Ann. Sc. Nat., 2d serie, t. vii, p. 43; et Exped. Suit. a Buffon, Apteres, vol. iv, p. 106; et Exped. L'Ameriq. du Sud (Castelneau), Myriapoda, p. 6.

" " *Newport*, Catal. Brit. Mus.

Fontaria Virginiensis, *J. E. Gray*, Griffith's Animal Kingdom Insecta, pl. 135, fig. 1.

Vix Polyd. Virginiensis, *H. De Saussure*, Memoir Soc. Hist. Nat. Geneva, tome xv, p. 320.

The color of this species is a dark reddish chestnut, with the lateral laminæ of bright yellow, sometimes verging towards orange. The under surface of the body is yellowish. The scuta are wrinkled as in P. corrugatus, but not to so great an extent, at least in the individuals that have fallen under my observation. The head is of the same color as the body; its vertex furrow is strongly pronounced; its anterior margin yellowish and broadly emarginate. The antennæ are lightish chestnut, and distally very pilose, almost pubescent. The posterior scutum is triangular, with its apex truncate; its color is that of the lateral laminæ. The latter have their anterior angles somewhat rounded, their posterior moderately acute, rarely prolonged except in the last four or five. The male appendages are large and robust; from each of the pair springs a small falciform spine, lying so close as not to be easily perceived. The terminal spine is set at an angle to the main process. Its base is very hairy, and has springing from it a long slender spinule. Distally the spine is bifid and curiously curved. [The figure represents only the terminal spine.] I have no specimens to enable me to describe the female appendages.

Fig. 49.

In some individuals there exists a well-pronounced black, median, dorsal line. In others the pattern of coloration approximates that of P. corrugatus; but I have never seen a well-pronounced margination of the scuta. There may be some doubt as to whether this is the species intended to be indicated in the original description of P. Virginiensis, which

would apply probably equally well to several species. In the absence of any type, it has seemed better to apply the name somewhat empirically, rather than to discard it altogether.

As far as I can determine, P. Virginiensis of Saussure is not the species here recognized, but represents rather the two species trimaculatus and corrugatus combined, both of which he appears to have had.

Hab. Middle States.

P. CORRUGATUS.

P. atro-castaneus, scutis fulvo postice marginatis; laminis lateralibus fulvis, latissimis; scuto anale triangulare, elongato, postico fulvo, apice truncato; appendicibus masculis maximis, spinulo laterale robusto subbreve vix curvato armatis; spina terminale maxima, robusta, compressa, tortuosa, spinulo basale armata. (Fig. 50.)

Blackish-chestnut; scuta margined with fulvous posteriorly; lateral laminæ yellowish, very broad; anal scutum triangular, elongate, posteriorly yellowish; its apex truncate; male appendages very large, armed with a rather short, robust, scarcely curved, lateral spinule; terminal spine very large, robust, compressed, tortuous, armed with a basal spinule.

P. CORRUGATUS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 6.

The color of the perfect animal is a chestnut-black, rarely reddish chestnut, with a moderately broad margin of fulvous [in alcoholic specimens] on each scutum. This band may be *red* during life. The scutæ beautifully polished to the naked eye, the microscope shows to be obsoletely wrinkled. Very many of these wrinkles are longitudinal. The head is of the same color as the body; medianly it is distinctly sulcate; inferiorly it is broadly and rather deeply emarginate. The scutal side plates are fulvous above and below. Their anterior angles are rounded, their posterior more or less acute, and in the hinder ones prolonged. The under surface of the body is of a light yellow. The male genital appendages are very large and robust. They have a short, slightly crooked spinule attached and lying close to their side. The terminal spine is irregularly spiral, and has near its base a curved spinule. At the point of its origin is a tuft of bristly hairs. Each female appendage (Fig. 51) is chiefly composed of a short, almost globular, scarcely at all pilose process, in one side of which there exists a large opening. Through the side opening projects a pair of large, thick plates, fitting together somewhat in the manner of bivalve shells. These nearly equal in height the main process. The spine on the second joint of the feet is robust, but acute. The whole animal is about one and a half inches in length.

Fig. 50.

Fig. 51.

Hab. Michigan.—Prof. Miles.—Trenton Falls, New York. Mus. Comp. Zoology.—D. Mack.

P. BIFIDUS.

P. rubro castaneus, segmentis et antice et postice late fulvo-marginatis, laminis lateralibus dilute fulvis; scuto anale triangulare, apice truncato et decurvato; appendicibus masculis, elongatis, pilosis; spina terminale gracillima, proxima cylindracea, ultima bifida et nonnihil abrupte curvata, spinulo basale gracillimo parvo armata.

Reddish-chestnut; segments both anteriorly and posteriorly broadly margined with yellowish; lateral laminæ dilute yellow; anal scutum triangular, its apex truncate and decurvate; male appendages elongate, pilose; their terminal spine very slender, proximally cylindrical, distally bifid, and somewhat abruptly curved, armed with a small, very slender basal spine.

P. BIFIDUS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 7.

All of my specimens have been preserved for a length of time in alcohol, so that the description of color is not as accurate as it should be. The anterior aspect of the head is much lighter than the vertex, which is medianly strongly canaliculate. The antennæ are dilute fulvous, rather longer than in *P. Virginiensis*, and distally, sparsely and shortly pilose. The spinules on the distal ends of the first and second joints of the long and slender feet are robust, but are often obsolete anteriorly. The terminal scutum has several punctæ closely resembling pores. The preanal scale is triangular; it has two little elevations surmounted by a punctum. The male appendages (Fig. 52) are elongate. Their terminal spine is very slender and cylindrical in its proximal portion; distally it is bifid and strongly curved. It is ornamented with a very slender curved basal spinule.

Fig. 52.

Hab. Georgia. Museum of Comp. Zoology.—Dr. Le Conte. Texas. Smithsonian Collection.—G. Wurdeman.

P. TRIMACULATUS.

P. saturate rubro-brunneus; scutis postice fulvo trimaculatis, corrugatis; antennis ultimis pilosis; appendicibus masculis maximis, crassis, ultimis obtuse rotundatis, spina terminali gracillima, enormiter convoluta. (Fig. 53.)

Deep reddish-brown; scuta posteriorly trimaculate with yellow, corrugate; antennæ distally pilose; male appendages very large, thick, distally obtusely rounded; terminal spine slender, irregularly convolute.

P. TRIMACULATUS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 6.

The color of this species is a dark reddish-brown. Each scutum has on the posterior

portion of its lateral lamina a bright yellow or orange spot, and a blotch of the same tint on the median portion of its posterior border. Occasionally this is so prolonged as almost to give the idea of a continuous transverse band. The first scutum has two central markings, situated the one on its anterior, and the other on its posterior border. These are so shaped and joined together as to suggest the idea of an hour-glass. The anal scutum is triangular and somewhat elongate. It is yellow, but has a dark spot on each side, and its truncate apex is tipped with brown. The head is chestnut-brown. Its vertex is deeply canaliculate, and its inferior lip distinctly emarginate and fringed with hairs. The antennæ are light-brown, slender, and not at all clavate. The feet are light-yellow, with their distal portion somewhat pilose and occasionally tipped with brown. The male genital appendages (Fig. 53) are very large and robust. Their terminal spine is simple, long, slender, and irregularly bent upon itself. They are also furnished with a small, nearly straight, spinule, placed proximally as to the terminal. The female appendages (Fig. 54) are short, thick, and bulbous. On one side of each there is an opening, with two projecting plates separated from one another by a linear orifice. I have seen a male and female, which were collected by Mr. E. D. Cope in Susquehanna County, Pennsylvania. They are about two inches long.

Fig. 53.

Fig. 54.

P. CRASSICUTIS.

P. maximus, robustus; scutis enormiter subrude punctatis; appendicibus masculis (Fig. 55), singula spinis quatuor, duobus magnis, parvis duobus armata.

Very large, robust; scuta irregularly, subrudely punctate; male appendages each armed with four spines; two large, two small.

P. CRASSICUTIS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 7.

The color of all the specimens is light-testaceous, with, in many, a dark dorsal line. It is very possible that the alcohol, in which they have been long preserved, may have destroyed the original color. The animal is very large and robust, and has its outer armor and side plates very heavy. The head on its upper surface has a distinct median furrow, and on its lower a broadly linear, oblique depression on each side. The inferior margin is rather broadly and deeply emarginate. The lateral laminæ are rather short. The female appendages (Fig. 40) are a pair of small, pyramidal, pilose bodies, whose apices are split into three or four very minute mameloid processes. The male organs are

Fig. 55.

large, and distally very hairy. They are each armed with two large and two small spines. The longer and more slender of the former at its proximal portion is bent rather abruptly at right angles to itself, but is nearly straight afterwards. The more robust is nearly straight, save at its distal extremity, where it is abruptly bent at right angles to itself. It is armed with several very slender spinules, and has one edge distantly and obsoletely denticulate. Of the smaller spines, one is short and blunt; the other much longer, sharp, slender, and falciform. The last scutum is triangular, and has its apex truncate and very slightly decurvate. The preanal scale is semi-orbicular. Length, 2 to 3 inches.

Hab. Mississippi.—Museum of Smithsonian.

Subgenus LEPTODESMUS.

Corpus subcylindricum. Dorsum valde convexum. Laminæ laterales parvæ.

Body subcylindrical. Dorsum very convex. Lateral laminæ small.

P. PLACIDUS.

P. olivacco-brunneus, scutis plerumque nigro vittatis; laminis lateralibus parvis, dilute brunneis; pedibus saturate olivaceis; sternis dilute brunneis; appendicibus (Fig. 56) masculis, valde elongatis; spina terminale magna, in spiram ducta et spinulo basali longissimo falciforme et altero laterale breve robusto instructa, margine partim acute serrato, partim integro.

Olive-brown; many of the scuta banded with black; lateral laminæ small, light-brown; sterna light-brown; male appendages strongly elongate; terminal spine large, spiral, furnished with a very long, falciform, basal spinule, and a second short, robust, lateral one; its margin partly entire, partly acutely serrulate.

P. PLACIDUS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 9.

The head is dark-colored. Besides its median furrow, it is ornamented with a pair of sometimes illy pronounced puncta on each side of the vertex. Its inferior border is rather broadly emarginate. The antennæ are elongate, dark-brown, and tipped with black. The anal scutum agrees with the others in color. It is triangular, with its apex truncate, obscurely emarginate and decurvate. The male genital appendages are strikingly elongate. The terminal spine is nearly black. It is bent spirally on itself, but after performing a little more than an entire turn is nearly horizontal for some length. It is flattened, with its superior surface somewhat umbonate, and ends in a thick, blunt, spine-like process. The proximal portion of the anterior margin is acutely serrate. From the edge projects a short thorn-like spinule, and from the base a long, slender, falciform spine. Length, 1¼ inches.

Fig. 56.

Hab. Michigan.—Prof. Miles.

P. FLORIDUS (Var. ?).

P. atro-castaneus; scutis postice rubro-aurantiaco marginatis; laminis lateralibus parvis, læte rubro-aurantiacis; appendicibus masculis *P. placidi* illis similibus.

Blackish-chestnut; scuto posteriorly marginate with reddish orange; lateral laminæ small, bright reddish orange; male appendages like those of *P. placidus*.

P. FLORIDUS (Var. ?), *Wood*, Proc. Acad. Nat. Sci., 1864, p. 9.

The head is lighter colored than the body. It is medianly canaliculate, with a pair of punctations on each side of its vertex. Its inferior border is broadly emarginate. The antennæ are rather long and slender, very slightly clavate, light-brown, and distally tipped with black. The scuta are smooth, beautifully polished, and not corrugate. The side plates are distant, quite small, and nearly horizontal, with their anterior angles rounded. The anal scutum is prolonged, and is sometimes wholly, sometimes partially, orange. It is triangular, with its truncate, decurvate, slightly emarginate apex projecting much beyond the anal scales. The feet are cylindrical, yellow, and somewhat pilose. The male appendages resemble those of *P. placidus*, except in color. They are yellowish. Those of the female consist of a pair of short, blunt processes. Each of these has a basal portion into which is set a short, somewhat flattened body, with an obscure linear opening traversing its distal surface. From the junction of these two parts springs a heavy fringe of long, coarse hair. *P. floridus* is very possibly a distinct species from *P. placidus*. I have seen but a single individual of the latter. The general appearance of the two is so dissimilar as to incline me to the belief of their distinctness; but they agree well as to their genitalia, and a suite of specimens might show their identity. Length, 1¼ inches.

Hab. Michigan.—Prof. Miles.

P. HAYDENIANUS.

P. olivaceo-castaneus; antennis modicis, sparse pilosis, ultimis nigris; laminis lateralibus luteis; appendicibus masculis hirsutis et processu lato breve et spinis duabus armatis; spina terminale (Fig. 57), modice robusta, valde curvata.

Olive-chestnut; antennæ moderate, sparsely pilose, distally black; lateral laminæ yellowish; male appendages hirsute, armed with a broad, short process and two spines; terminal spine moderately robust, strongly curved.

P. HAYDENIANUS, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 10.

Judging from an alcoholic specimen, the color of this animal is an olive-chestnut, with the side plates yellowish, and the posterior portions of the scuta much lighter than the

anterior. The head is bright-chestnut, and is ornamented with a median furrow on its vertex, and a pair of impressed dots on each side of its face. Its inferior border is medianly moderately emarginate. The margins of the side plates are somewhat thickened. The anal scutum is yellowish, small, subtriangular, and distinctly emarginate posteriorly. The feet are very slender, and are shortly pilose. The femora of the hinder ones are armed each with a small spine on their distal extremity. The small male appendages are hairy at the base. They are armed with a broad, obtuse, spinous process, and a slender curved spine besides the terminal. The latter is robust, and is bent with a double curve, that is, anteriorly and laterally. I have dedicated this species to my friend, Dr. Hayden, whose name is inseparably connected with the natural history of the Far West.

Fig. 57.

Hab. Oregon.—Museum of the Smithsonian.

Subgenus STRONGYLOSOMA.

Corpus cylindricum. Laminæ laterales subnullæ.

Body cylindrical. Lateral laminæ very small.

P. ERUCA.

P. brunneus? robustus; antennis brevibus, pilosis, haud clavatis; scutis subrude punctatis; pedibus parvis, gracilibus, modice hirsutis.

Brown? robust; antennæ short, pilose, not clavate; scuta subrudely punctate; feet small, slender, moderately hirsute.

P. ERUCA, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 8.

Judging from the badly preserved alcoholic specimens, the color of this species is reddish-brown, with the side plates a lighter color. The body is very robust. The head has a median furrow on its vertex, and its lower border emarginate. The side plates, excepting the posterior, which are better pronounced, have but the posterior angles, which are acute. The scuta appear to have a narrow edging of black posteriorly. The terminal scutum is subtriangular, very prolonged and very thick posteriorly. I have never had an opportunity of examining the male organs. Those of the female are very pilose, and are formed of two portions. They are contracted at their bases, and expanded above, somewhat as a reversed flattened cone. The basal piece is thicker and less hairy than the other. The distal piece is set into it, and has an opening along the free extremity.

Hab. Oregon.—Museum of the Smithsonian.

Fam. POLYXENIDÆ, *Newport.*

"Caput arcuatum, prominens. Corpus latum. Pedes attenuati; coxis maximis. Segmentum anale fasciculis longis."

Head arcuate, prominent. Body broad. Feet attenuate, with very large coxæ. Anal segment with long fasciculi.

As I have never seen a specimen of this family, the characters of it and the genus are those given by Mr. Newport, Philos. Trans., vol. xix, p. 277.

Gen. POLYXENUS, *Latreille.*

"Corpus breve, squamis parvis penicillatis vestitum. Pedum paria 13."

Body short, clothed with small penicillate scales. Pairs of feet 13.

P. FASCICULATUS.

"Body pale-brown, linear, incisures ciliated, fasciculated each side; head deeply ciliated before. Segments smooth, ciliate at the incisures, and fasciculate with brown setæ each side; terminal pencil cinereous; head semi-orbicular, depressed, deeply and densely ciliated on the edge with setæ; eyes small, oval, prominent, placed obliquely in the middle of the lateral margin; antennæ very short, thick, reddish-brown; feet white. Length rather more than the one-tenth of an inch."

"Inhabits the Southern States."

Say, Journ. A. N. S., 1st series, vol. ii, p. 108.

Sub Ord. SUGENTIA.*

Caput parvissimum, conicum. Os elongatum, tubulatum. (Figs. 58, 59.)

Head very small, conical. Mouth elongate, tubular.

In the Sugentia the head is very small, and is so placed as to be almost entirely concealed beneath the broad anterior scuta. The parts around the mouth are so fused together as to make a conical beak of greater or less length, suitable only for the imbibition of liquid food. The eyes may be present or absent. The antennæ are formed according to the type of the Diplopoda, with seven joints. The body is composed of numerous segments. The scuta may be prolonged laterally into laminæ, but afford protection only to the back and flanks; the central part of the abdomen is not covered by a firm,

* Order Sugentia, Brandt, Recueil.

resistant shell. The feet are hidden beneath the broad body. The male genitalia are placed in the seventh segment. In the classification of the families and genera I have followed Mr. Brandt,* his arrangement, as far as the two species I have seen enable me to judge, being founded on natural characters.

He adopts two families, which are characterized by the presence and absence of eyes. Though this would of itself scarcely seem to be sufficient to separate groups of such rank, yet, as it is associated with many differences in form &c., it serves as the most tangible distinguishing mark.

This suborder seems to stand at the bottom of the Myriapoda. In external appearance and form it approaches most nearly to the Vermes, and has undoubtedly the lowest structural development.

Fam. POLYZONIDÆ.

"Oculi parvi, simplices, in media fronte inter antennes conspicui."†

Eyes small, simple, conspicuous in the middle of the anterior surface of the head between the antennæ.

Mr. Brandt described this family under the name of Ommatophora, and the following under the name of Typhlogena; but I have adopted the names of Polyzonidæ and Siphonophoridæ of Newport, for the reason that the former are not consistent with the laws of modern scientific nomenclature.

Genus OCTOGLENA.‡

Oculi octo, in seriebus duabus simplicibus dispositi. (Fig. 59.)

Eyes eight, arranged in two simple series.

The eyes in this genus are very prominent, and are arranged in two straight rows, which are so placed, one on each side near the base of the antennæ, as to be convergent inferiorly.

O. bivirgata.

O. brunnea, utrinque virga fusca ornata; segmentis fere 45.

Brown, with a fuscous stripe on each side; segments about 45.

O. bivirgata, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 186.

* Recueil De Mem., p. 49. † Brandt, *loc. cit.*

‡ Wood, Proc. Acad. Nat. Sci., 1864, p. 186. γλυη, oculus.

The head of this species is very small, and is pilose. The antennæ are rather heavy, and are very pilose. The eyes are large and very prominent. The dorsum is slightly

Fig. 58.

Fig. 59.

convex, and is ornamented on each side by a broad fuscous stripe, which is intersected by numerous, indistinct, dark lines.

The scuta are very smooth, and have no distinct lateral plates, but their edges are rather thin and strongly elevated. The penultimate scutum is much broader than its neighbors. The last scutum is very small. The feet are dark-colored. There are two or three specimens in the possession of the Academy, which, I believe, were collected by Dr. John L. Le Conte, U. S. A., in the mountains of Georgia. Fig. 58 represents the under, Fig. 59 the upper surface of the head.

Fam. SIPHONOPHORIDÆ.

Oculi nulli.

Eyes none.

Genus BRACHYCYBE.*

Rostrum acutum, brevissimum, antennis multo brevius. (Fig. 60.)

Rostrum acute, very short, much shorter than the antennæ.

I have never studied the allied genus *Siphonophora* of Brandt, but, if the characters relied on by that author are at all generic, there can be no doubt that the American species belongs to a distinct genus. In *Siphonophora* the rostrum or mouth is very much elongated, and approaches the antennæ in length. In *Brachycybe* the latter are several times the longer.

B. Le Conti.

Fulvo-brunneus? dorso modice convexo, medio leviter canaliculato; antennis parvis, filiformibus, pilosis; scutorum superficie asperata, obscure transverse canaliculata; scuto postremo postice spinæ obtusæ serie instructo; laminis lateralibus longis, angustis, vix sejunctis; segmentis 17; pedibus breve pilosis.

* *Wood*, Proc. Acad. Nat. Sci., 1864, p. 187. Βραχυς, brevis. Κυβος, rostrum.

Yellowish-brown?; dorsum moderately convex, medianly lightly canaliculate; antennæ small, filiform, pilose; surface of the scuta rough, obscurely transversely canaliculate; last scutum furnished posteriorly with a series of obtuse spines; lateral laminæ long, narrow, scarcely separated; segments 47; feet shortly pilose.

B. Le Conti, *Wood*, Proc. Acad. Nat. Sci., 1864, p. 187.

In our specimens, which have been preserved for a long time in alcohol, the color is a light yellowish-brown. The anterior scuta are tubercnlate, the posterior merely roughened.

Fig. 60.

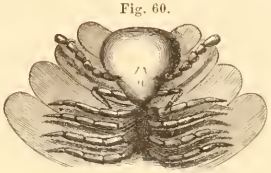
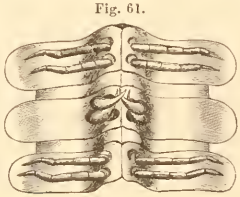


Fig. 61.



Each has a more or less obsolete transverse groove extending all across the lateral laminæ. The latter are very long and narrow; they are placed very close together, and are often bent slightly backwards. Their external margin is somewhat oblique, and is furnished in all except, perhaps, the most anterior, with a pore. The small feet are entirely concealed beneath the broad body. The male appendages (Fig. 61) consist of two pairs of acute feet-like processes. It affords me much pleasure to dedicate this species to Medical Inspector John L. Le Conte, U. S. A., as an acknowledgment of the many assistances which he has afforded me in the prosecution of my studies.

Hab. Georgia.—Collection of the Acad.———Mus. Comp. Zoology. Dr. John L. Le Conte, U. S. A.

SYNOPSIS OF NORTH AMERICAN MYRIAPODA.

Class Myriapoda.

Ord. CHILOPODA.

Segments of the body provided with a single pair of feet.

Sub Ord. SCHIZOTARSIA.

Tarsi composed of a very great number of small joints.

Fam. CERMATHIDÆ.

Gen. Cermatia.

C. forceps.

Sub Ord. HOLOTARSIA.

Tarsi composed of but few joints.

Fam. LITHOBIIDÆ.

Dorsal scuta 15, two sets; a smaller scutum alternating with a larger.

Gen. Lithobius.

Excavations on the posterior coxæ large, ovate, arranged in a single series upon a depressed face.

L. Americanus. Scuta smooth, not rugose. Labial denticules about 10.

L. planus.† Scuta rugose. Labial denticules about 14.

L. paucidens. Labial denticules about 4.

Gen. Bothropolys.

Excavations on the posterior coxæ small, almost round; arranged in a three or four-fold series on a scarcely depressed face.

B. multidentatus. Ocelli on each side from 32—37.

B. Nauti. Ocelli on each side 18. Surface of the scuta very roughly rugose.

B. bipunctatus. Ocelli on each side 18. Surface of the scuta but slightly roughened.

† Species marked with a cross have never been identified by the author.

FAM. SCOLOPENDRIDÆ.

Feet-bearing segments 21—23.

GEN. SCOLOPENDRA.

Cephalic segment imbricate. Pairs of feet 21. Eyes 4 on each side.

Antennæ more than 20 articulate.

S. heros. Brownish. Antennæ 25 articulate. Basal joint of the last pair of legs with 5—7 spines on the inner surface; 7—10 on the lower, arranged in a threefold series. Length, 6 inches.

Var. castaneiceps. Green, with the head and appendages bright reddish-chestnut.

S. polymorpha. Brownish. Antennæ 30 articulate. Basal joint of last pair of legs with 3—7 spines on inner surface; 10—18 on the lower, arranged in a fourfold series. Length, 4 inches.

S. viridis. Greenish. Antennæ 23 articulate. Basal joint of last pair of legs with 2—5 spines on inner surface, 7—12 on the lower. Length, 2½ inches.

S. Copeana. Yellowish-chestnut, sprinkled with green. Antennæ 25 articulate. Basal joint of last pair of feet very slightly longer than the tibial, with 4—6 spines on the inner surface, 9—17 on the lower. Length, 4 inches.

Antennæ not more than 20 articulate.

S. inæquidens. Greenish. Antennæ 17 articulate. Basal joint of last pair of legs with 3—8 spines on the inner surface, 7—10 on the lower. Length, 4 inches.

S. byssina. Greenish or brownish. Antennæ 18 articulate. Basal joint of last pair of legs longer than the tibial, with 2—3 spines on its inner surface.

S. bispinipes. Olivaceous. Antennæ 19 articulate. Basal and tibial joints of last pair of legs about equal in length; basal bispinous.

S. longipes. Chestnut. Antennæ 17 articulate. Last pair of feet very long, with 30—50 spines apiece. Length, 5 inches.

S. morsitans. Brownish. Antennæ 20 articulate. Basal joint of last pair of legs with its superior margins strongly elevated; inner surface with 5 spines; lower 7—9, arranged in a threefold, alternating series.

GEN. CRYPTOPS.

Feet-bearing segments 21. Eyes none. Last scutum as in Scolopendra.

C. hyalina.†

C. Milbertii.†

GEN. OPISTHEMEGA.

Opisthemega. Feet-bearing segments 21. Eyes none. Last scutum the largest.

O. postica. Basal joint of last pair of feet not armed with a spine, and its margins not serrulate.

O. spinicauda. Basal joint of last pair of feet armed with a spine, and its inner margins serrulate.

GEN. THEATOPS.

"Eyes distinct. Feet-bearing segments 21. Joints of the last pair of feet obconic, large, abbreviate."

T. postica.†

GEN. SCOLOPOCRYPTOPS.

Eyes none. Feet-bearing segments 23.

Margin of the labium nearly straight.

S. sexspinosa. Scuta not rugose. Lateral anal appendages with a very minute rudimentary spinule on their supero-posterior angle.

S. spinicauda. Scuta somewhat rugose. Lateral anal appendages with a well-pronounced, black spinule on their supero-posterior angle.

Margin of the labium shaped like an inverted w.

S. gracilis. Basal joint of last pair of feet longer than the tibial; the three last joints only pubescent. Lateral anal appendages elongate.

S. lunatipes. Basal and tibial joints of last pair of feet about equal. Tibial, tarsal, and metatarsal joints roughly pubescent. Lateral anal appendages short.

FAM. GEOPHILIDÆ.

Anterior subsegment of each segment not completely atrophied. Segments very numerous. Antennæ 14 articulate.

GEN. MECISTOCEPHALUS.

Cephalic segment elongate, narrow, more than twice longer than broad. Prebasal segment separate. Basal and subbasal segments coalescent.

M. fulvus. Fulvous. Head light orange. Cephalic segment rapidly contracted and rounded off at its posterior end. Pairs of feet 57.

M. limatus. Orange? Head deep red. Cephalic segment regularly narrowed from the front. Pairs of feet 43—44.

M. melanonotus. Light orange, with two broad, irregular, blackish bands, from the head to the penultimate segment, involving nearly the whole dorsum. Pairs of feet about 50.

GEN. GEOPHILUS.

Cephalic segment subquadrate. Prebasal segment coalesced with the basal. Posterior margin of the basal segment much longer than anterior.

G. cephalicus. Anterior portion of the body obscurely orange; the posterior olivaceous. Feet 48 pairs.

Var. ?—Feet 51 pairs.

G. lævis. Orange; with a double, blackish, anteriorly obsolete, dorsal line, terminating rather abruptly at the penultimate segment. Feet 53 pairs.

G. brevicornis. Deep orange. Cephalic segment small, sparsely subprofoundly punctate. Antennæ rather short. Pairs of feet 55.

G. bipuncticeps. Orange. Cephalic segment large, copiously profoundly punctate. Antennæ rather long. Feet 61—63 pairs.

GEN. STRIGAMIA.

Cephalic segment small, generally subtriangular, narrowed anteriorly. Body anteriorly attenuate.

Coxæ of last pair of legs impressed with little pits.

S. bothriopus. Bright red. Pairs of feet 50.

S. Walkeri. Orange. Pairs of feet 64.

S. bidens. Orange. Pairs of feet 76.

Coxæ of last pairs of feet not pitted.

S. fulva. Pairs of feet 47. Cephalic segment subtriangular.

S. chionophila. Pairs of feet 43. Cephalic segment subquadrate, medianly canaliculate.

S. lævipes. Pairs of feet 69. Head rather large.

S. parviceps. Pairs of feet 71. Head small, impunctate.

S. cephalica. Pairs of feet 75. Head large, impunctate.

S. maculaticeps. Pairs of feet 77. Head obscurely red and minutely maculate with white, rather small.

S. laticeps. Pairs of feet 81. Head large, impunctate. Length, 3 inches.

S. epileptica. Pairs of feet 81. Head rather small, minutely maculate with white. Length, 5½ inches.

S. tæniopsis. Pairs of feet 141.

S. rubens.† Pairs of feet 50.

S. Whitei.† Pairs of feet 76.

Ord. II. DIPLOPODA.

Each fully developed segment of the body provided with two pairs of feet.

Sub Ord. STRONGYLIA.

Mouth furnished with jaws suitable for the mastication of vegetable matters.

Fam. POLYDESMIDÆ.

Sternum and scutum of each segment fused together into a complete ring. Body composed of few segments; each furnished with lateral laminæ.

Gen. Polydesmus.

Lateral pores on the 5—7—9—10—12—13—15—16—17—18—19 scuta.

Subgenus Polydesmus.

Dorsum complanate. Lateral laminæ large, horizontal.

*P. setiger.** Scuta with minute, obtuse, tuberculoid scales (sometimes obsolete) with a row of acute, conical, seta-tipped tubercles along the posterior border.

*P. granulatus.** Scuta covered with convex, obtuse, tuberculoid scales, arranged in four more or less irregular transverse series; none of them seta-tipped.

P. hispidus.† Scuta with scales in five series.

P. serratus. Scuta with 9—10 complanate scales, arranged in two series, besides a third obsolete series.

P. Canadensis. Color brown. Scuta with 8 scales, arranged in two series.

P. cerasinus. Color cherry-red. Scuta like in *P. Canadensis.*

Subgenus Paradesmus.

Dorsum moderately convex. Lateral laminæ large, horizontal.

P. erythropygus. Olive-chestnut; scuta with a large orange spot on their posterior surface. Lateral laminæ orange. Anal scutum broad, prolonged.

P. hispidipes. Olive-brown, immaculate. Anal scutum triangular.

Var.? Ornamented with small orange spots. Lateral laminæ orange.

Subgenus Fontaria.

Dorsum convex. Lateral laminæ large, depressed.

P. Virginiensis. Chestnut, with yellowish lateral laminæ.

* Probably these two species belong to a new genus.

P. corrugatus. Blackish chestnut, with yellowish lateral laminæ, and the scuta posteriorly margined with yellow.

P. bifidus. Reddish chestnut, with yellowish lateral laminæ and the scuta both anteriorly and posteriorly margined with yellow.

P. trimaculatus. Deep reddish brown, with three bright orange spots on each scutum.

P. crassicutis. Very large. Scuta irregularly subrudely punctate.

Subgenus Leptodesmus.

Dorsum strongly convex. Lateral laminæ small.

P. placidus. Olive brown. Scuta banded with black. Lateral laminæ light brown.

P. floridus. Blackish chestnut; scuta margined posteriorly with reddish orange. Lateral laminæ orange.

P. Haydenianus. Olive chestnut. Lateral laminæ yellowish.

Subgenus Strongylosoma.

Body cylindrical. Lateral laminæ very small.

P. eruca.

Fam. IULIDÆ.

Posterior subsegments, with their sterna atrophied. Segments numerous, without lateral laminæ.

Genus Iulus.

The second scutum not produced anteriorly at the sides so as to abut against the head.

a. Last scutum mucronate.

* *Mucro small.*

I. impressus. Reddish chestnut. Segments 52. Scuta scarcely at all pilose.

I. pilosiscuta. Brownish chestnut. Segments 58. Scuta very pilose.

I. Oregonensis. Bright chestnut. Segments 45. Scuta scarcely at all pilose.

** *Mucro large.*

† *Mucro uncinate.*

I. Canadensis. Brightish chestnut, with a black dorsal stripe and series of black dots on each side. Segments 53. Mucro very large.

I. immaculatus. Dark reddish brown, immaculate. Segments 51. Mucro moderate.

†† *Mucro straight, or nearly so.*

I. Pennsylvanicus. Segments 63. Scuta on the upper surface distantly and obsoletely canaliculate.

I. canaliculatus. Segments 51. Scuta on the upper surface closely and deeply canaliculate, and furnished with a ring of distant long hairs.

I. laqueatus. Segments 49. Scuta on the upper surface closely and deeply canaliculate, but not furnished with a ring of hairs.

I. exiguus.† Segments 33.

b. Last scutum not mucronate.

I. cinerefrons. Brownish, annulate with ash color. Scuta with their upper surface smooth. Segments 34 ?—45 ?.

I. Milesii. Deep brown. Upper surface of scuta nearly smooth; lower surface closely and deeply canaliculate. Segments 33.

I. cærulo-cinctus. Brown, annulate with bluish rings. The surface of the scuta regularly but rather distantly canaliculate. Segments 42.

I. hortensis. Brownish, with series of strongly pronounced black dots on each side. Segments 42. Scuta closely canaliculate above and below.

I. virgatus. Deep brown, with the dorsum luteous, and ornamented with a black median line. Segments 35. Scuta closely canaliculate above and below.

I. minutus.†

I. stigmatosus.†

Gen. Spirobolus. Second scutum produced forwards at the sides so as to abut against the head.

Upper surface of scuta not canaliculate.

S. marginatus. Brown, with reddish annuli. Head very abundantly punctate. Segments 53—57.

S. uncigerus. Brown, with reddish annuli. Head rather sparsely punctate. Segments 50—53.

S. spinigerus. Fulvous, with very large greenish maculæ. Segments 48.

Upper surface of scuta canaliculate.

S. angusticeps.

Fam. LYSIOPETALIDÆ.

Sterna atrophied, not coalescent with or united by suture to the scuta.

Gen. Spirostrephon.

S. lucurius. Scuta keeled. Segments 59.

S. cæsio annulatus. Scuta not keeled. Segments 32.

Sub Ord. SUGENTIA.

Parts about the mouth consolidated into a tubule fitted for the imbibition of liquid food.

Fam. POLYZONIDÆ.

Eyes simple, conspicuous.

Gen. Octoglena.

Eyes eight.

O. bivirgata.

Fam. SIPHONOPHORIDÆ.

Eyes none.

Gen. Brachycybe.

Rostrum much shorter than the antennæ.

B. Le Contii.

REMARKS ON THE NATURAL ARRANGEMENT OF THE MYRIAPODA.

Since this memoir has gone to press, the author has had the opportunity of examining some specimens of the Pentazonia of Brandt, and has been led thereby to extend and somewhat modify the classification of the Myriapoda as adopted in the body of the paper. It was stated that all modern authors, except Mr. Brandt, agree in dividing the Myriapoda into the two primary groups, Chilopoda and Chilognatha, calling them orders or suborders, according as they assign to the Myriapoda the rank of class or order in the zoological scale. Several reasons for following this were adduced, but in one particular I was led into error by a mistake of Mr. Newport. It was in the assertion that the Diplopoda* have *always* the genitalia in the anterior portion of the body, which is incorrect. Nevertheless, the appearance and structure of the two orders are so unlike that there can be no doubt of their distinctness. There is one difference which has never had the prominence given to it that, as it seems to me, it deserves. In the Chilopoda the head is always developed

* Chilognatha and Diplopoda are used here as synonymous, interchangeable terms—not with the meaning assigned to them in an earlier part of the memoir.

into *two separate segments*, the *posterior* of which gives origin to the immense foot-jaws, whilst in the Chilognatha the head is composed of but a single segment. An apparent contradiction of this exists, however, in the Cermatiidæ. When viewed from above, the head of one of this family appears to consist of but a single segment; but this is merely because the two cephalic scuta are fused together and consolidated into one, just as two body scuta are. The sternum of the posterior segment is entirely separate, and bears the foot-jaws as in the other families. In like manner, in the Lithobiidæ, the second cephalic scutum is very small, agreeing with the smaller scuta of the body.

The arrangement of the Chilopoda adopted in this memoir is very nearly that of Mr. Newport, which appears to be the true exposition of the plan of their creation. His families are natural, and are grouped according to their affinities. The Cermatiidæ deservedly stand at the top, on account of their more perfect organization and approach in some characters towards the Hexapoda. They have, as has been just stated, but a single scutum to two segments. In the Lithobiidæ the posterior scuta of each pair is atrophied, evincing a tendency to disappear, and, at the same time, the antennæ are almost multiarticulate. It is evident how these two facts ally them to the Cermatiidæ, and indicate a position at the top of the Holotarsia, which is confirmed by the fewness of the segments of the body and their active habits. On the other hand, the tendency of the first subsegments to become enlarged and approach the Diplopod type in the Geophilidæ, indicate their position as low in the scale, which is also confirmed by the great number of the segments of the body and the poorly developed nervous system.

Dr. Leach (Linn. Trans., xi), M. Gervais (Apteres, vol. iv), and Mr. J. E. Gray (Encyl. Anat. Phys., art. Myriap.), have placed the Chilopoda below the Chilognatha, a position which is totally repudiated by their more highly developed nervous and vascular systems, as well as by their habits and external form. They are the carnivora of the Myriapoda, and undoubtedly are superior to the vegetable feeders.

There have been offered, within a few years, three different classifications of the Chilognatha, by Messrs. Newport, J. E. Gray, and J. F. Brandt. Mr. Lucas has also published a synopsis (Hist. Nat. des Crustac. des Arachn. et des Myriap., tome iv, 1840), to which I have not had access, but, according to Mr. Newport, it differs from that of M. Gervais only in the names of the families.

J. E. Gray (*loc. cit.*) proposes to divide the Chilognatha into *six* families, the Iulidæ, Craspedesomidæ, Polydesmidæ, Glomeridæ, Zephironidæ, and Polyxenidæ. He does not attempt to arrange these into higher groups, and totally ignores the existence of the *Sagenia!* His *Craspedesomida* is probably the same family as that known in this paper as the *Lysiopetalidæ*, and the others appear to correspond with those of the same names, although his characters are very different.

M. Gervais (Apteres, vol. iv), divides the Chilognatha into *five* families,—the POLYXENIDÆ, GLOMERIDÆ, POLYDESMIIDÆ, IULIDÆ, and POLYZONIIDÆ. Of these, the *Polyxenidæ* and *Polydesmidæ* are the same as the same-named families of Gray, whilst the *Glomeridæ* comprise the *Glomeridæ* and *Zephroniidæ* of that author, and the *Iulidæ* his *Iulidæ* and *Craspedesomidæ*.

The *Polyzoniidæ* are the *Sugentia* of Brandt. Thus:

GRAY.	GERVAIS.
Polyxenidæ.	Polyxenidæ.
Glomeridæ. Zephroniidæ.	Glomeridæ.
Polydesmidæ.	Polydesmidæ.
Iulidæ. Craspedesomidæ.	Iulidæ.
None.	Polyzoniidæ.

M. Brandt (Recueil, p. 36), composes his "TRIBUS II" (Chilognatha) of all the Diplopoda, except the *Sugentia*. This tribe he divides into three families,—MONOZONIA, TRIZONIA, PENTAZONIA. The first of these comprises the *Polyxenidæ* and *Polydesmidæ* of Gray; the second, the *Iulidæ* and *Craspedesomidæ;* the third, the *Glomeridæ* and *Zephroniidæ* of that author. The *Sugentia* he divides into two sections, the OMMATOPHORA and TYPHLOGENA, which are respectively the *Polyzoniidæ* and *Siphonophoridæ* of Newport.

Mr. Newport (Linn. Trans., vol. xix), divides all the Chilognatha (including the Sugentia) into six families,—GLOMERIDÆ, POLYXENIDÆ, POLYDESMIDÆ, IULIDÆ, POLYZONIIDÆ, SIPHONOPHORIDÆ. Of these, the *Glomeridæ* includes the *Glomeridæ* and *Zephroniidæ* of Gray; the *Polydesmidæ* the *Polydesmidæ* and perhaps the *Craspedesomidæ** of the same author; the *Polyxenidæ* and *Iulidæ* correspond to his families of the same name, whilst the *Siphonophoridæ* and *Polyzoniidæ* are the *Sugentia* of Brandt. Mr. Newport then associates these six families in three groups, which he calls tribes: 1st. "PENTAZONIA, *Brandt*," comprising the *Glomeridæ*. 2d. "MONOZONIA, *Brandt*," comprising the *Polyxenidæ* and *Polydesmidæ*. 3. "BIZONIA, *Newport*," comprising the *Iulidæ*, *Polyzoniidæ*, and *Siphonophoridæ*.

* It is almost impossible to make out the exact limit of the Craspedesomidæ of Gray: it may be that Mr. Newport divides the group intended to be characterized by Mr. Gray, and puts only a part of it into his Polydesmidæ, and the rest into his Iulidæ.

Thus it will be seen that he elevates two of M. Brandt's families to the rank of tribes, and unites his Sugentia and Trizonia to constitute a third. To show, perhaps, a little more clearly and correctly the relations of these three arrangements, a table is appended, in which the positions of the families, &c., are altered from the places originally assigned to them by the authors, so as to compare with one another.

CHILOGNATHA.

Gray.	Gervais.	Brandt.	Newport.
Fam. Polyxenidæ.	Fam. Polyxenidæ. . . .	Fam. Monozonia (*partim*). .	Tribe, Monozonia (*partim*). Fam. Polyxenidæ.
Fam. Glomeridæ. Fam. Zephroniidæ.	Fam. Glomeridæ. . . .	Fam. Pentazonia.	Tribe, Pentazonia. Fam. Glomeridæ.
Fam. Polydesmidæ. . . .	Fam. Polydesmidæ. . .	Fam. Monozonia (*partim*). .	Tribe, Monozonia. Fam. Polydesmidæ (*partim*).
Fam. Iulidæ. . . . . Fam. Craspedosomidæ.	Fam. Iulidæ.	Fam. Trizonia.	Tribe, Bizonia (*partim*). Fam. Iulidæ (*partim*).
None.	Fam. Polyzoniidæ. . .	Order, Sugentia. . . . . Sections, Ommatophora, Typhlogena.	Tribe, Bizonia (*partim*). Fam. Polyzoniidæ. Fam. Siphonophoridæ.

The characters employed by the several authorities in separating the various groups are so different and often so defective as to make it a task of some difficulty to understand the exact limits of their families, &c., and almost impossible to compare the several classifications so as to produce a regular synonymy of the genera. In some cases characters have been assigned as generic which vary not merely in the same species, but even in a single individual. Mr. Brandt has given more fully than any of the others the sum of the differences between his families; but even he has not seized and brought forward, as seems to me at least, the separating distinctive characters which run all through, so as to show the unity of the plan of the creation of this class; or, in other words, the successive steps in the Divine thought, which is embodied and, as it were, crystallized into form. Although this monograph of a single faunic group is not the place for a discussion of the history of the classification of the Myriapoda, yet it has seemed necessary to make this brief notice of and comparison between the works of the more recent authorities, before introducing what appears to the author to be the natural arrangement, which has been gradually developed by the various efforts; each adding something, each pushing forward a little towards the truth.

As has been stated before, the arrangement of the Chilopoda adopted is precisely that

of Mr. Newport, with an alteration of the characters. Had that able naturalist lived to make his studies of the second order as complete as those of the first, he doubtlessly would so have altered his classification of the Chilognatha as to have left just as little to be done in them.

In the first part of this memoir the Iulidæ were placed above the Polydesmidæ. I am convinced that this was an error, and that Mr. Newport is right in assigning them a lower rank. On glancing over the Chilopoda it will be seen that, as we descend the scale, the number of segments in the body constantly increases—or, in other words, the distinctive character which separates the Myriapods from the Hexapods and Crustacea, and allies them to the Annelids,—the multiplicity of segments, the absence of cephalization—is exaggerated. On applying this principle, it will be at once perceived that the Polydesmidæ must be placed above the Iulidæ, and the Glomeridæ, Leach (of Newport), be still higher, and thus be thrown next to the first order.

There is one character which allies the Glomeridæ to the Chilopoda, whose importance has been overlooked, and which seems to me to fix their place unquestionably. It is a curious circumstance that so careful a naturalist as Mr. Newport should misstate such an important anatomical fact. The genitalia in the Glomeridæ are placed, not as in the rest of the order, in the anterior portion of the body, but in the posterior, thus agreeing with the Chilopoda. It is very interesting to see a character which, in the higher group is characteristic of an order, thus becoming so degraded in a lower group as to belong only to suborders; and still more so when, as in this case, the same change takes place in the value of one or more other characters. On examining the mouths of the various families of the Chilopoda it will be seen that they are all formed after one common type; this indeed, is so altered that there is something more or less peculiar in each; but still there is one fundamental pattern to be traced all through, from the highest to the lowest. Not so in the Chilognatha; in them there are two distinct types. The one of these, which is the more aberrant from the Chilopod type, belongs to those families which are farthest from that order. The two characters just spoken of do not go side by side, as it were, but overlap one another; that is, the families nearest to the Chilopoda have the genitalia in the posterior portion of the body and the manducent form of mouth; whilst those which come next to these retain the latter, but have the genitalia removed forwards; then a step further and the families lose both these characters, having the sugescent mouth and the anterior position of the genitalia.

It seems to me, therefore, that we are thus brought to the three grand divisions—the suborders of the Chilognatha or Diplopoda; that these are the characters which, running through the class, furnish the groundwork for its arrangement. This is confirmed by a set of sub-characters, if, indeed, they ought not to be considered full characters. In these

again there is a similar but less marked degradation in value as we go from the higher to the lower order. There is very little alteration in the segments of the body in the Chilopoda. They are all formed after one common type; more or less parallelopipedal, with a solid sternum below and scutum above separated by membranous sides, which give origin to the appendages. The only important aberrations from this are the occasional fusion of two scuta into one, and at times a slight development of the atrophied subsegment. Not so in the Chilognatha; here there are three distinct types of form and composition of the segments. Now *each of these is peculiar to one of the three divisions indicated*, strongly corroborating their claims to rank as suborders.

There is one imperfection in my knowledge of the subject which I recognize and would guard against. I have never seen any of the species of the Polyxenidæ, and have not read a sufficiently accurate description of them and their anatomy to be able to assign their place; yet is it questionable but that they belong in one of the three suborders? There seems to be no room for a fourth division.

CLASS MYRIAPODA.

ORD. I. SYNGNATHA.*

Caput segmentis duobus distinctis compositum. Corporis segmenta subsegmenta unica efformata, singula pedum par unicum instructa. Organorum sexualium apertura ad extremitatem posteriorem.

Ord. Syngnatha, *Leach*, Linn. Trans., vol. xi, 1815, p. 381.†

Ord. Chilopoda, *Latreille*, Cours D'Entomologie, 1831, p. 175, *et auctores*.

* Although it would seem much better to retain the name of Chilopoda, it having been so universally adopted, yet the prior appellation must have the preference. I have used Chilopoda all through this memoir through ignorance of the priority of Syngnatha.

† Mr. Newport states (Linn. Trans., vol. xix, p. 273) that the name Syngnatha was originally proposed by M. Latreille, and adopted by Dr. Leach. Dr. Leach, however, gives the name as his own (*loc. cit.*), and I have not been able to find it in any of the works of Latreille at my command. Mr. Newport does not refer to the place where the latter uses it.

Sub Ord. I. SCHIZOTARSIA.

Antennæ multiarticulatæ, corpore multo longiores. Scuta singula segmenta duo obtegentia. Oculi compositi. Tarsi multiarticulati, longissimi.

Fam. Schizotarsia, *Brandt*, Recueil, p. 26.
Tribe Schizotarsia, *Newport*, Linn. Trans., vol. xix, p. 274.

Fam. 1. CERMATIIDÆ. Scuta 8, singula stigmata mediana postice instructa.

Fam. Cermatides, *Leach*, Linn. Trans., vol. xi, 1815, p. 381.
Fam. Scutigeridæ, *Gray*, Cyclop. Anat. et Physiol., vol. iii, 1847, p. 546.
Fam. Scutigeridæ, *Gervais*, Apt., vol. iv, p. 56.
Fam. Cermatiidæ, *Newport*, Linn. Trans., vol. xix, p. 275.

Sub Ord. II. HOLOTARSIA.

Antennæ 12—60 articulatæ, corpore haud longiores. Scuta singula segmento unico obtegentia. Oculi simplices vel nulli. Tarsi 3 articulati, breves.

Fam. Holotarsia, *Brandt*, Recueil, p. 26.
Tribe Holotarsia, *Newport*, Linn. Trans., vol. xix, p. 275.

Fam. 2. LITHOBIIDÆ. Scuta 15, inæqualia, in seriebus duabus alternantibus disposita.

Fam. Lithobiidæ, *Newport*, Linn. Trans., vol. xix, p. 275, *et auctores*.

Fam. 3. SCOLOPENDRIDÆ. Scuta 21—23, in serie unica disposita. Pedum postremorum coxæ magnæ, incrassatæ, armatæ.

Fam. Scolopendridæ, *Leach*, Linn. Trans., vol. xi, p. 381 (*partim*).
Fam. Scolopendridæ, *Newport*, Linn. Trans., vol. xix, p. 275, *et Gervais*.
Fam. Scolopendridæ, *Gray*, Encycl. Anat. Physiol., vol. iii, p. 547 (*partim*).

Fam. 4. SCOLOPENDRELLIDÆ.* "Corpus pedesque breves, appendicibus styliformibus. Segmenta inæqualia; scutis 16 dorsalibus imbricatis. Antennæ elongatæ, articulis ultra 16."

* I have never seen a specimen of this family, and give the characters assigned by Mr. Newport.

Sub Fam. Scolopendrellinæ, *Newport*, Linn. Trans., vol. xix, p. 276.
Fam. Scolopendrellidæ, *Newport*, Linn. Trans., vol. xix, p. 374.
Fam. Geophilidæ, *Gervais*, Apteres, vol. iv, p. 56 (*partim*).

Fam. 5. GEOPHILIDÆ. Scuta numerosa, in serie unica disposita. Antennæ 14 articulatæ.

Fam. Geophilidæ, *Leach*, Linn. Trans., vol. xi, p. 384.
Sub Fam. Geophilinæ, *Newport*, Linn. Trans., vol. xix, p. 276.
Fam. Geophilidæ, *Newport*, Linn. Trans., vol. xix, p. 374.
Fam. Geophilidæ, *Gervais*, Apt., vol. iv, p. 56 (*partim*).
Fam. Scolopendridæ, *Gray*, Encycl. Anat. and Physiol., vol. iii, p. 547 (*partim*).

ORD. II. CHILOGNATHA.

Caput segmento unico compositum. Corporis segmenta subsegmentis duobus efformata, singula pedum paria duo instructa.

Ord. Chilognatha, *Latreille*, Cours D'Entomologie, 1831, p. 175.
"Ord. Diplopoda, *Blainville*," *Gervais*, Annal. Sc. Nat., 3me series, vol. ii, 1844, p. 59.*
Ord. Diplopoda, *auctores*, haud *Wood*.

Sub Ord. III. PENTAZONIA.

Os manducens. Organorum sexualium apertura ad corporis extremitatem posteriorem.

Fam. Pentazonia, *Brandt*, Recueil, p. 38.
Tribe Pentazonia, *Newport*, Linn. Trans., vol. xix, p. 276.

Fam. 6. GLOMERIDÆ. Oculi serie lineare utrinque dispositi. Antennæ in capitis fronte positæ.

Fam. Glomerides, *Leach*, Linn. Trans., vol. xi, p. 376.
Fam. Glomeridæ, *Newport* et *Gervais* (*partim*).
Fam. Glomeridæ, *Gray*, Encyclop. Anat. Physiol., vol. iii, p. 546.

* M. Gervais gives no reference to the place where M. Blainville indicated this order, and I have not been able to find it.

Fam. 7. SPHÆROTHERIDÆ.* Oculi aggregati. Antennæ in capitis latera positæ.

Tribe Sphærotheria, *Brandt*, Recueil, p. 174, 1841.
Fam. Zephroniidæ, *Gray*, Encyclop. Anat. and Physiol., vol. iii, p. 546, 1847.
Fam. Glomeridæ, *Newport* et *Gervais* (*partim*).

Sub Ord. IV. STRONGYLIA.†

Os manducens. Organorum sexualium apertura in corpore antico.

Sub Ord. Diplopoda, *Wood*, haud *auctores*.‡

Fam. 8. POLYXENIDÆ.§

Fam. Polyxenidæ, *Newport*, Linn. Trans., vol. xix, *et auctores*.

Fam. 9. POLYDESMIDÆ. Scuta et sterna arcte conjuncta. Corporis segmentum annulum integrum faciens, laminis lateralibus instructum.

Fam. Polydesmides, *Leach*, Linn. Trans., vol. xi, p. 381.
Fam. Polydesmidæ, *Gervais*, Apteres, vol. iv, p. 123 (*partim*).
Fam. Polydesmidæ, *Newport*, Linn. Trans., vol. xix, p. 277 (*partim*).
Fam. Oniscodesmidæ et Polydesmidæ, *Saussure*, Mem. Soc. Hist. Nat. Geneva, tome xv, p. 272.‖

Fam. 10. IULIDÆ. Scuta et sterna arcte conjuncta. Subsegmentorum posticorum sterna nonnihil obsoleta. Corporis segmenti annulus postice emarginatus, laminis lateralibus haud instructus.

* Mr. Brandt described the genus Sphærotheria a year before the figures of Zephronia were published in Griffith's Animal Kingdom (see Recueil, p. 173), and his name must stand for the genus. Moreover, the first indication of the family by Mr. Gray, which I can find, is that given above, which is several years later than that of Brandt.

† *στρογγυλος*, teres.

‡ To retain the name of Diplopoda with such an entire alteration of its significance, as I was at first disposed to do, would make a great deal of confusion, and there is really no principle of nomenclature or usage demanding that it should be done.

§ This family is inserted here, following Mr. Newport.

‖ It is very evident, as shown by M. Saussure, that Gervais was in error in placing the genus Oniscodesmus in the Glomeridæ. It does not seem to me, however, that the Oniscodesmidæ merit the rank of a family; the group appears to be nothing more than a sub-family at most.

Fam. Iulides, *Leach*, Linn. Trans., vol. xi. p. 377 (*partim*).
Fam. Iulidæ, *Newport* et *Gervais* (*partim*).
Fam. Iulidæ, *Gray*, Encyclop. Anat. et Phys., vol. iii, p. 545.

Fam. 11. LYSIOPETALIDÆ. Scuta et sterna disjuncta. Sterna obsoleta. Corporis segmenti annulus imperfectus.

Fam. Iulides, *Leach* (*partim*).
Fam. Craspedesomidæ, *Gray*, Ency. Anat. et Physiol., vol. iii, p. 546.*
Fam. Iulidæ, *Newport* et *Gervais* (*partim*).
Sub. Fam. Lysiopetalinæ, *Newport*, Linn. Trans., vol. xix, p. 278.
Sub Fam. 2. (Fam. Polydesmidæ), *Newport*, loc. cit , p. 277.†

Sub Ord. V. SUGENTIA.

Os sugens. Organorum sexualium apertura in corpore antico posita.
Ord. Sugentia, *Brandt*, Recueil, p. 45.

Fam. 12. POLYZONIIDÆ. "Ocelli conspicui, fronti inter antennas in seriebus transversis inserti."

Section Ommatophora, *Brandt*, Recueil, p. 49.
Fam. Polyzoniidæ, *Newport*, Linn. Trans., vol. xix, p. 278.

Fam. 13. SIPHONOPHORIDÆ. "Oculi nulli."

Section Typhlogena, *Brandt*, Recueil, p. 50.
Fam. Siphonophoridæ, *Newport*, Linn. Trans., vol. xix, p. 278.

* I am unable to decide how nearly the Craspedesomidæ of Gray coincide with this family.
† I have some doubt as to this synonym.

CORRIGENDA.

For *lamina* read *laminæ*, p. 191, et passim.
For *antenna* read *antennæ*, p. 148, et passim.
For *a hexapod larva and a myriapod*, p. 140, read *the hexapod larva and myriapoda*.
For *Iulus marginatus*, p. 190, read *Spirobolus marginatus*.
For *Craspedosomida*, p. 191, near the middle, read *Lysiopetalidæ*.

PLATE I.

Fig. 1. 1 *a*, 1 *b*. Scolopendra castaneiceps. (Natural size.)

2. Bothropolys multidentatus. (Magnified.)

3. Lithobius Americanus. (Magnified.)

4. Opisthemega postica. (Natural size.) One of the hind feet is a *reproduced* appendage.

5. Scolopocryptops sexspinosa. (Natural size.)

6. Scolopendra polymorpha. (Natural size.)

7. Mecistocephalus lineatus.

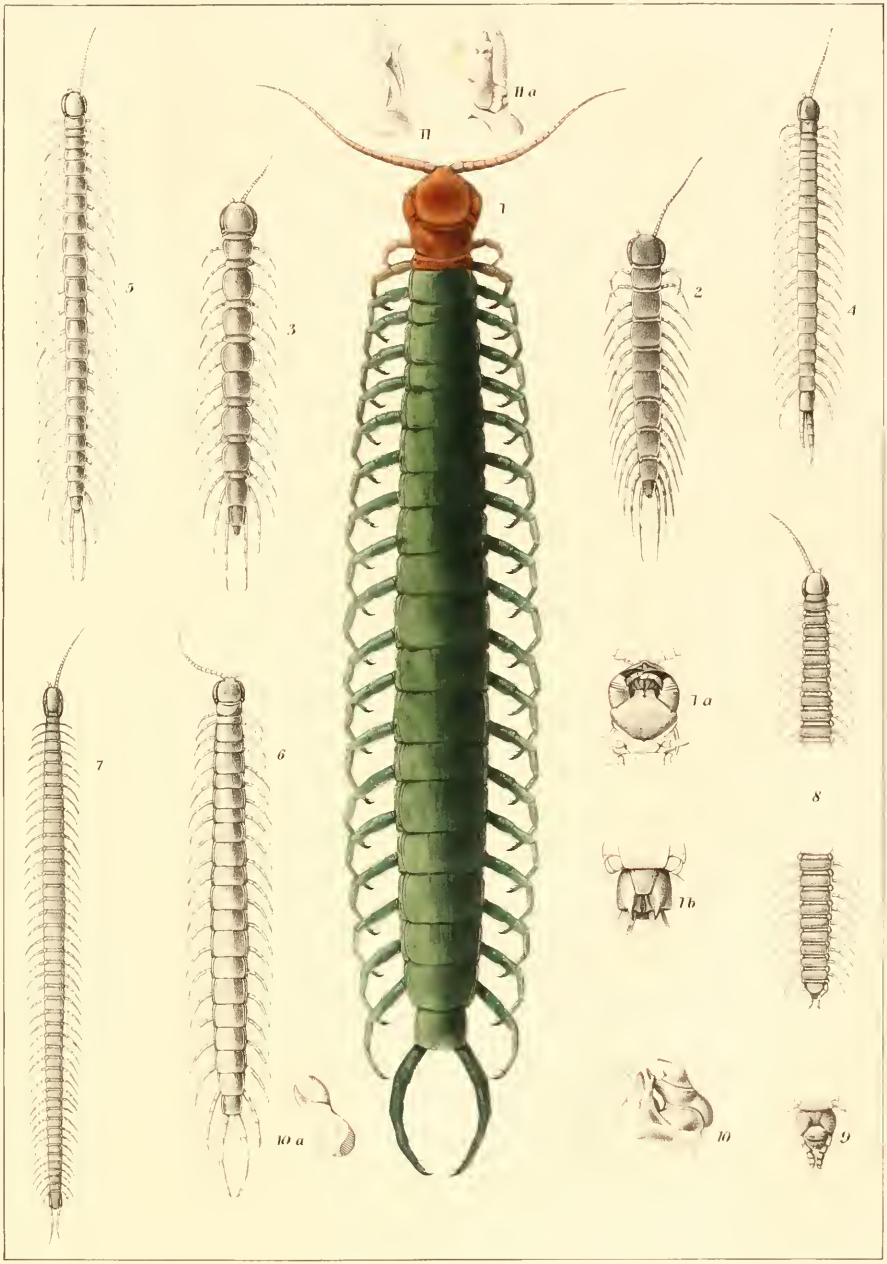
8. Strigamia epileptica.

9. Strigamia bothriopus.

10. Male appendages of Oligaspis puncticeps.

10 *a*. View of the other surface of the outer claw of the same.

11, 11 *a*. Male appendages of Iulus Canadensis.



Drawn by A.J Ibbotson

Bowen & Co lith & col. Philada.

PLATE II.

Fig. 1.* Iulus immaculatus.

2. Iulus Pennsylvanicus. This figure is scarcely hairy enough, and not sufficiently acutely mucronate.

3. Iulus venustus.

3 *a*. Head of the Male of same.

3 *b*. Head of the Female.

4. Iulus Canadensis.

5. Iulus canaliculatus.

6. Brachycybe Le Contii.

7. Polydesmus Canadensis.

8. Polydesmus granulatus.

9. Polydesmus serratus.

10. Polydesmus setiger.

11, 11 *a*. Spirostrephon lactarius.

12. Iulus pilosiscuta. (This figure is not good, the hairs instead of being merely indicated should be prominent.)

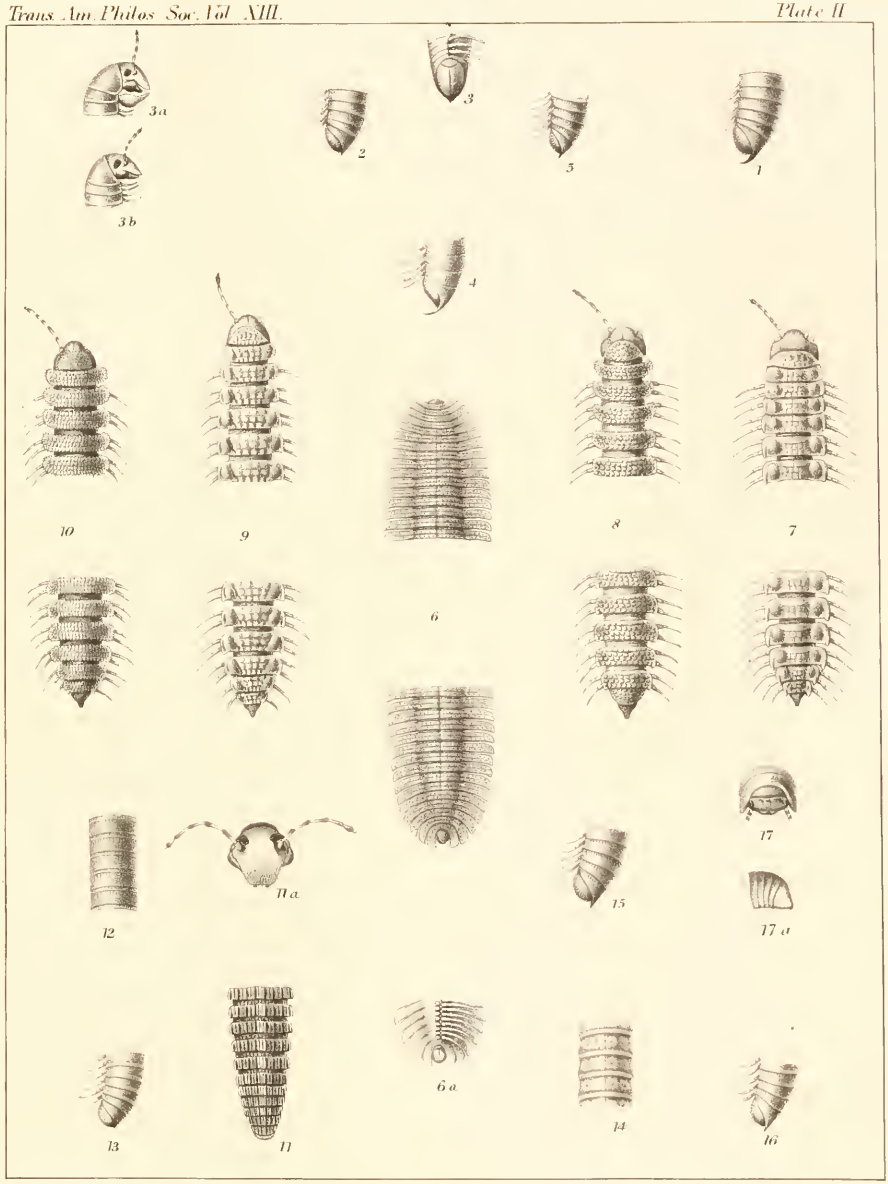
13. Iulus virgatus.

14. Spirostrephon cæsioannulatus.

15, 16. Iulus laqueatus. (Fig. 15 is the better.)

17, 17 *a*. Oligaspis puncticeps. (Natural size.)

* All the figures on this plate are magnified



Drawn by A.J. Ibbotson

Bowen & Co. lith. Philada.

PLATE III.

Fig. 1. Cermatia forceps. (Natural size.)

1 *a*. Magnified view of head of same.

2. Spirobolus marginatus. (Natural size.)

2 *a*. Head of the same. (Magnified.)

2 *b*. Tail of the same. (Magnified.)

3. This figure is a failure; it does not even resemble what it was drawn from

4. Polydesmus erythropygus. (Natural size.)

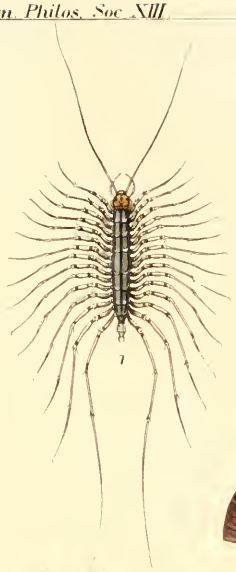
5. Polydesmus floridus. (Natural size.)

6. Polydesmus corrugatus. (Natural size.)

6 *a*. Magnified view of under side of posterior portion of same.

7. Polydesmus trimaculatus. (Natural size.)

8. Polydesmus Virginiensis. (Natural size.)


1

2

3

2a

2b

4

1a

6a

5

6

7

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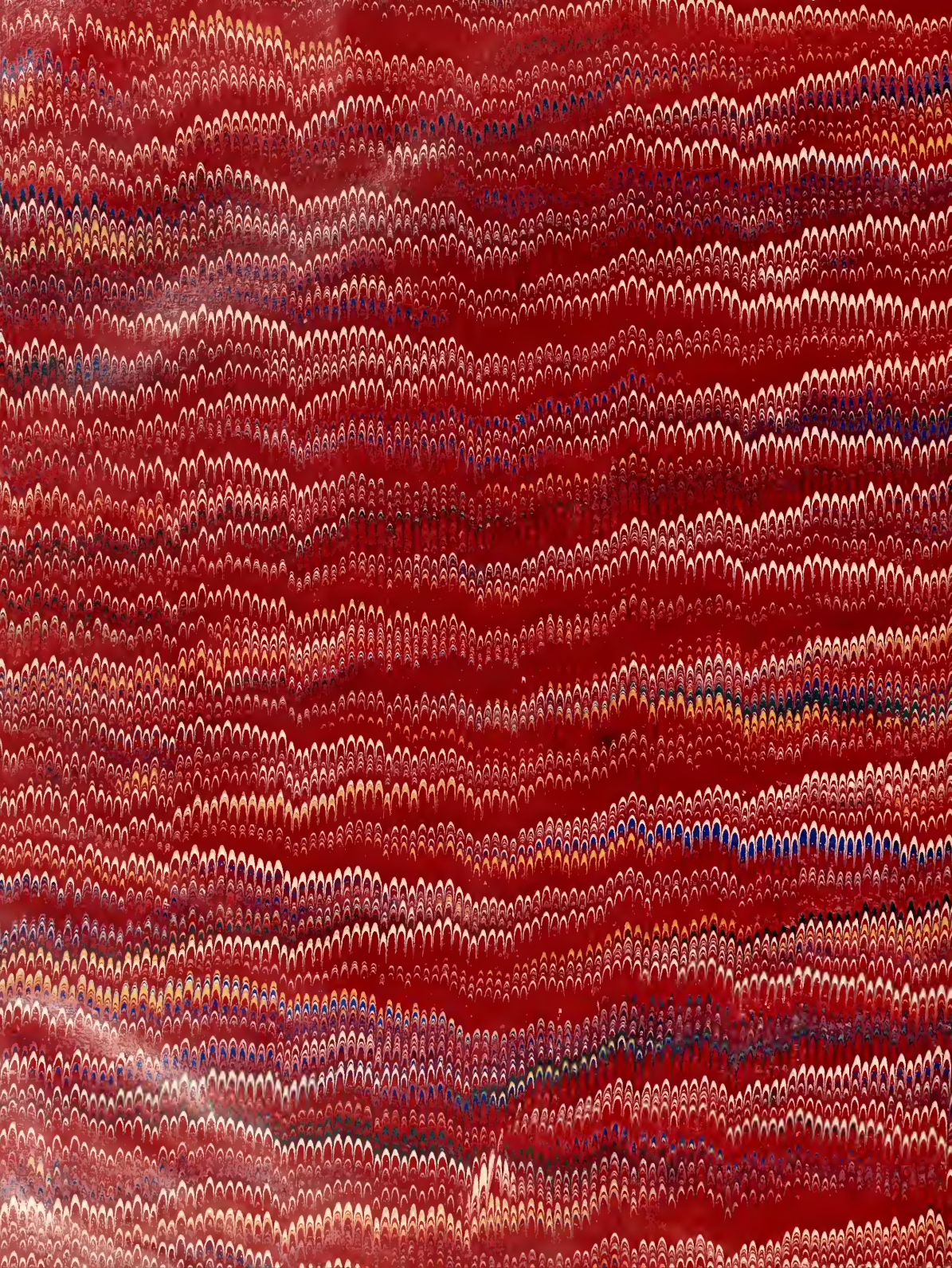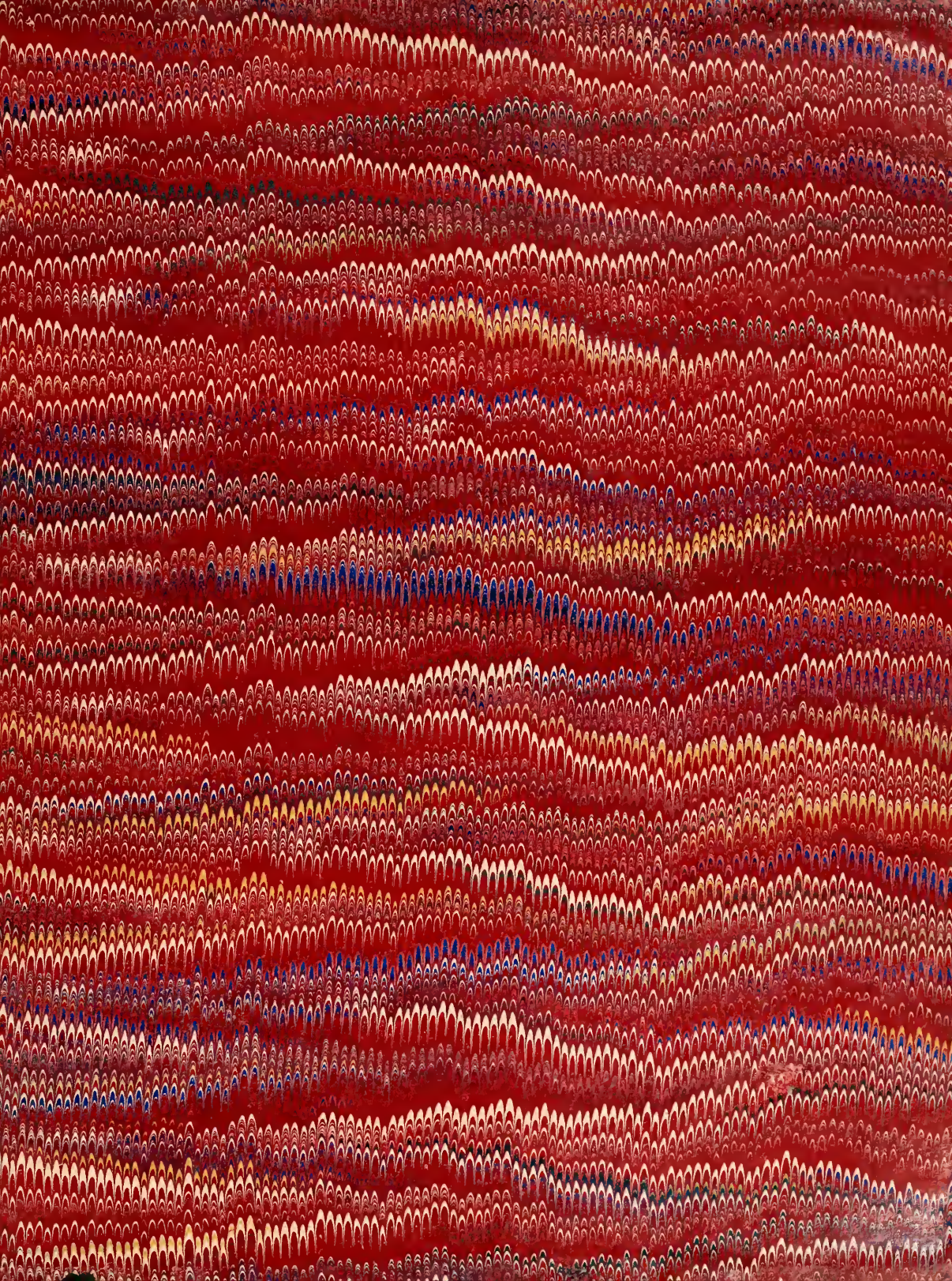
Drawn by A J Ibbotson Bowen & Co lith & sc Philada